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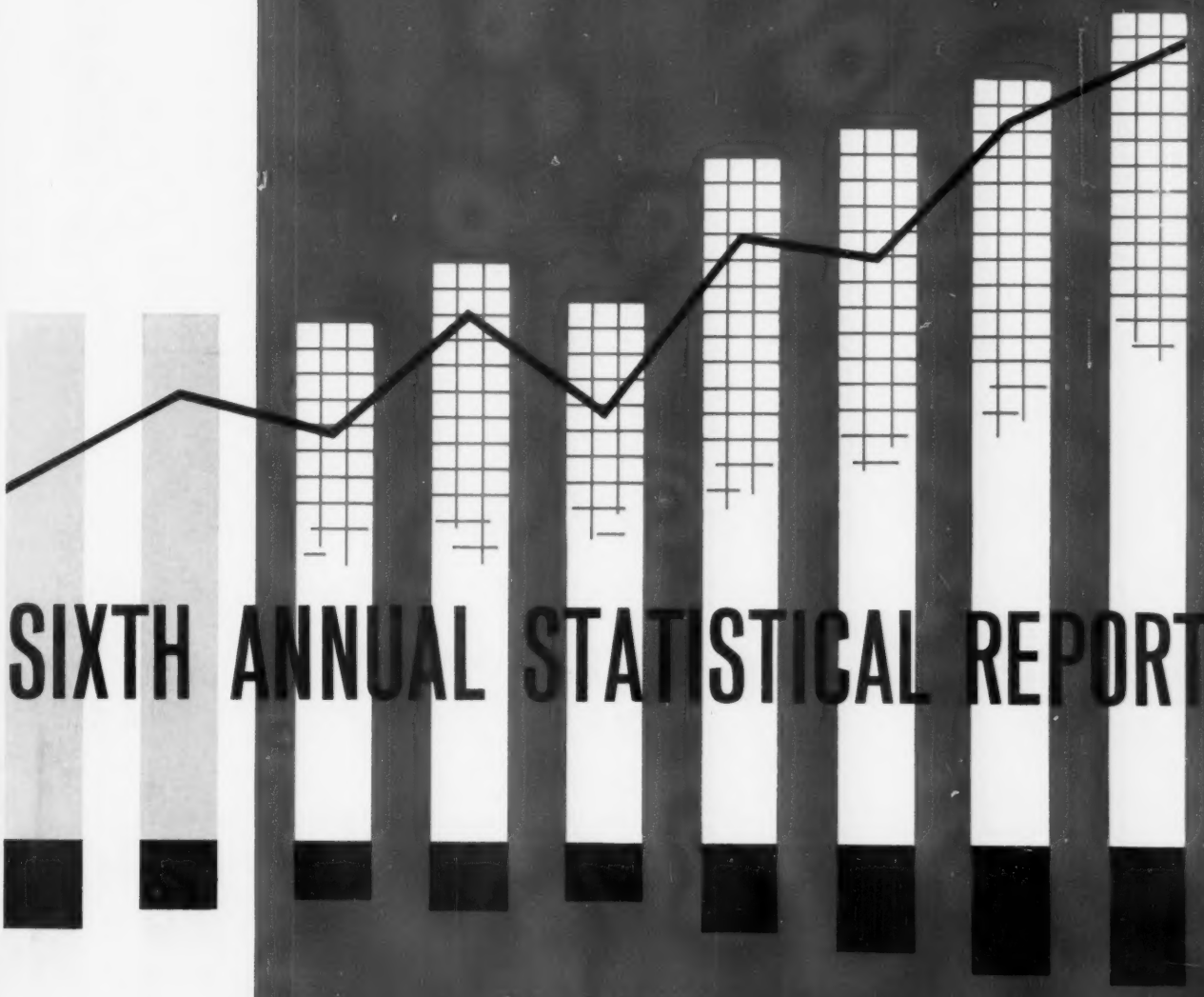

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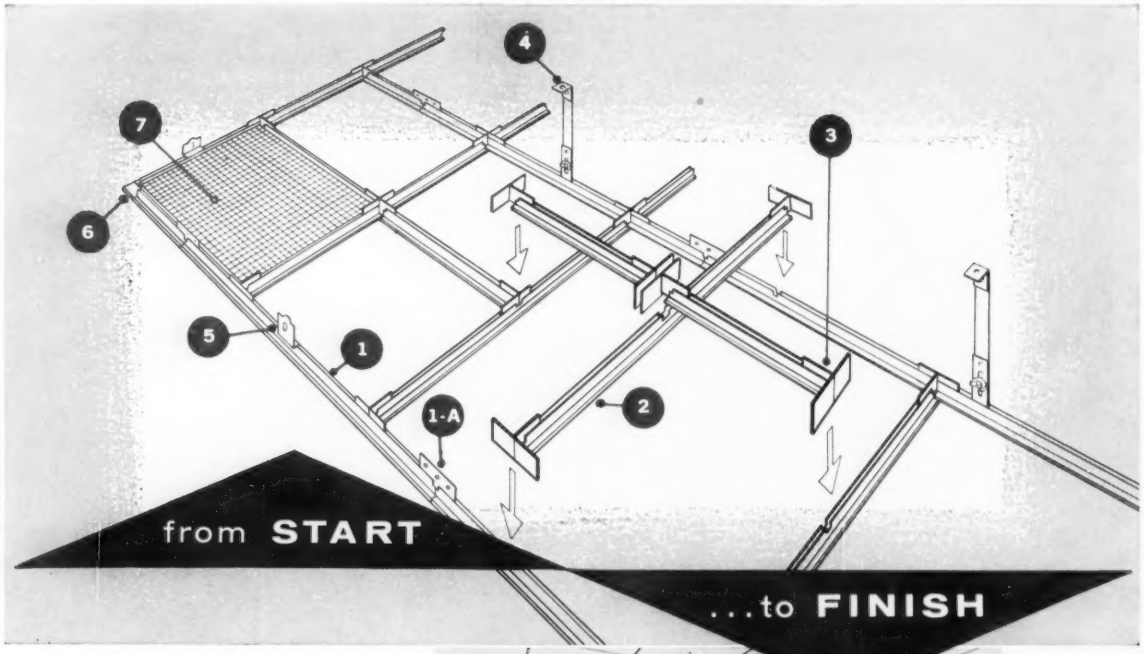

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Published for electrical contractors, electrical departments in industry, engineers, consultants, inspectors and motor shops. Covering engineering, installation, repair, maintenance and management in the field of electrical construction and maintenance.

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By B. C. COOPER—A growing national economy, prospect of a record year in building construction, and continuing progress in electrical equipment designs, standards, and technology all point to continued electrical growth and progress in the year ahead.

Voltage Drop in Apartment Houses 102

By FREDERICK LATZER—Design limitation of voltage drop in circuits can add substantially in increased copper, raceway and labor costs of the overall system. For this reason, permissible voltage drop in any system should be realistically related to the voltage characteristics of load devices supplied. Here's a close look at voltage drop in terms of efficiency vs economics for apartment house wiring.

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How to Compute Conductor Fill in Raceways 110

By J. H. WATT—With the 1959 NEC permitting more than nine conductors in conduits, the possibility of different sizes of conductors occupying the same raceway has been greatly increased. New tables are offered to simplify calculations for estimators and designers who must determine raceway sizes in combinations not shown in present NEC tables. Examples are given to explain the application of the tables and a general discussion follows.

Electric Heating Forum No. 3 114

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ELECTRICAL CONSTRUCTION AND MAINTENANCE

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Sidelights

STATISTICAL SUMMARY

In spite of the traditional economic uncertainties that crop up in presidential election years, the present and foreseeable future for the electrical industry shapes up to a conservatively optimistic outlook. There is a good prospect that 1960 will be a record year for construction and consequently for related electrical work. The current trends in the national economy, industry and electrical activity are reported by Associate Editor Berlon C. Cooper in our annual statistical summary.

VOLTAGE DROP

Arbitrary voltage drop limitations applied at full design loads often add substantially to costs. Some of the resulting increase in copper and related components may prove to be unnecessary if system performance is realistically related to the voltage characteristics required for the loads supplied. Frederick Latzer, Consulting Engineer of New York, N. Y., discusses the practical aspects of voltage drop considerations in apartment buildings from extensive experience in his article on page 102.

CONDUIT FILL

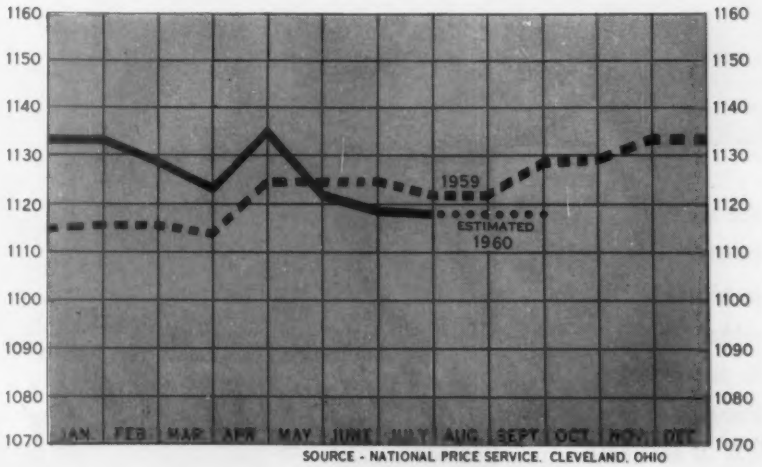
With the 1959 NEC permitting more than nine conductors in a conduit, the probability of conductors of different sizes occupying the same raceway has been greatly increased. Individual calculations are laborious and guesswork can be costly. To simplify calculation for the estimator and engineer who must determine raceway sizes for conductor combination not shown in NEC tables, Associate Editor John H. Watt has prepared tables by means of which raceway sizes can be found by simple addition. These handy tables are presented and described in "How to compute . . . Conductor Fill in Raceways" beginning on page 110.

CHANGING THE CODE

Relatively few engineers and contractors who live with the National Electrical Code daily realize that they can influence or inspire changes and improvements. Even with a legitimate beef, where this practical field experience with code applications and interpretations could be most valuable, they often remain silent because they don't know the procedures. In the interests of a better code, more practical, experienced, experts should speak when they have a constructive contribution to make. How? Read "How You Can Help to Improve the NEC," page 213.

ELECTRICAL MATERIALS COST INDEX

BASE LINE (1000) REPRESENTS COSTS OF TYPICAL ASSORTMENT OF MATERIALS FOR A SELECTED JOB AS OF NOVEMBER 1, 1951. INDEX POINTS REPRESENT THE VARIATION OF THESE SAME MATERIAL COSTS AS OF THE FIRST OF EACH MONTH.



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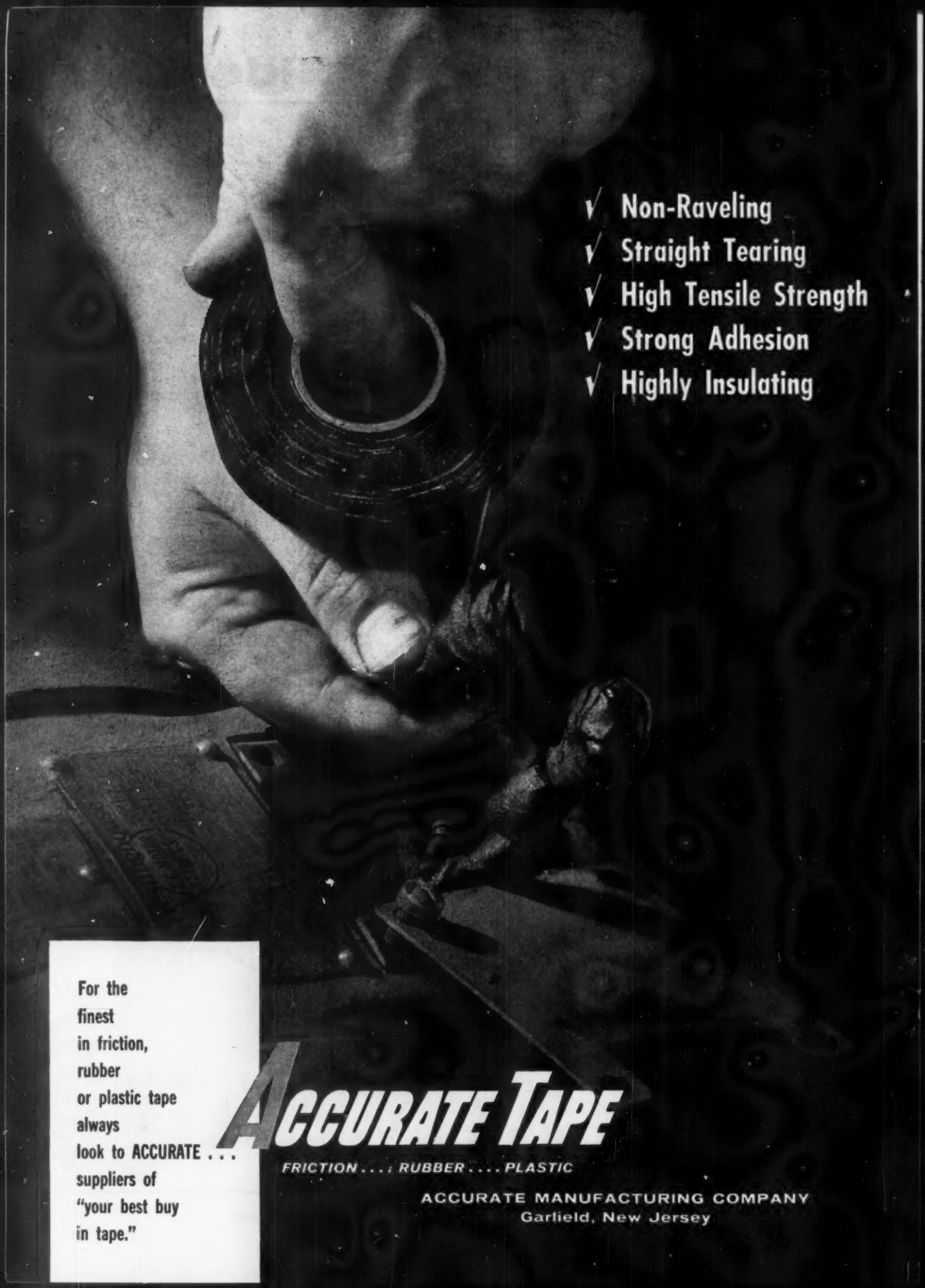
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Washington Report

A possible economic decline has been prevented, in part, by record spending for nondurable goods by consumers. Also, exports have risen, and government has spent a little more, primarily at the state and local level. Thus the consumer is, in essence, generating the activity that creates the income for his spending.

Personal income hit a new peak in July, at an annual rate of $407.1 billion. This was a billion dollars higher (annual rate) than in June, and an increase of $20.2 billion (annual rate) over July 1959. The rate of gain, on a month-to-month basis, is declining. The July rise stemmed primarily from a congressionally-approved pay increase for Federal employees, and from larger building industry payrolls.

Industrial output remained steady in July, at an FRB Index of 109 (1957 = 100), up only one point from July 1959. Production in August is expected to change very little, if any, but in September a slight upturn is predicted.

Growth of the national economy will be much discussed during the current Presidential campaign, as both the Democratic and the Republican nominees agree on the need for accelerated growth of the economy. Such growth is considered essential (a) to provide the resources for the long struggle with Communism, and (b) to deal with growing economic and social domestic problems which stem from population growth, rapidly increasing numbers of aged people, surging growth of the labor force, urban decay and wasting natural resources, and technological change that alters the structure of our society and the skills and knowledge demanded of the labor force.

Other goals on which there is considerable agreement between the two major political parties include: a stronger U. S. defense effort; hold the free world together, and strengthen its alliances both economically and militarily; build a powerful second-strike deterrent to safeguard the peace.

Just how each Presidential candidate and his party would achieve these goals, it is hoped, will be spelled out by them during the campaign, as well as other goals on which the candidates may differ.

New construction spending in July was less than in June despite a slight pickup in spending for new private residences, Dept. of Commerce reported. The July value of construction put in place was $5,182 million, or a seasonally-adjusted annual rate of $55.5 billion. This is down $72 million (annual rate) from the June rate, which drop occurred mainly in public construction projects, notably military facilities and highways.

Homebuilding in July, based on the number of housing starts, declined 10% from June. The seasonally-adjusted annual rate in July was 1,173,000 units, the lowest since last March's low rate for the year of 1,112,000 units due to severe winter weather, and 26% below the annual rate for July 1959. Census officials did not look for much improvement in August, since building permits have also been dropping for several months. For the first seven months of this year, housing starts are nearly 19% behind the similar period of 1959.

Electric power output hit a new peak in the week ending July 30, when production rose to 14.7 billion kwhr, 7% more than during the similar week in 1959. The previous record output was 14.5 billion kwhr for the week ending January 21, 1960.

Orders placed for electrical generating equipment during the first half of this year, measured in generating capacity in kw, increased over orders for the first half of 1959 by 70%, according to EEI.

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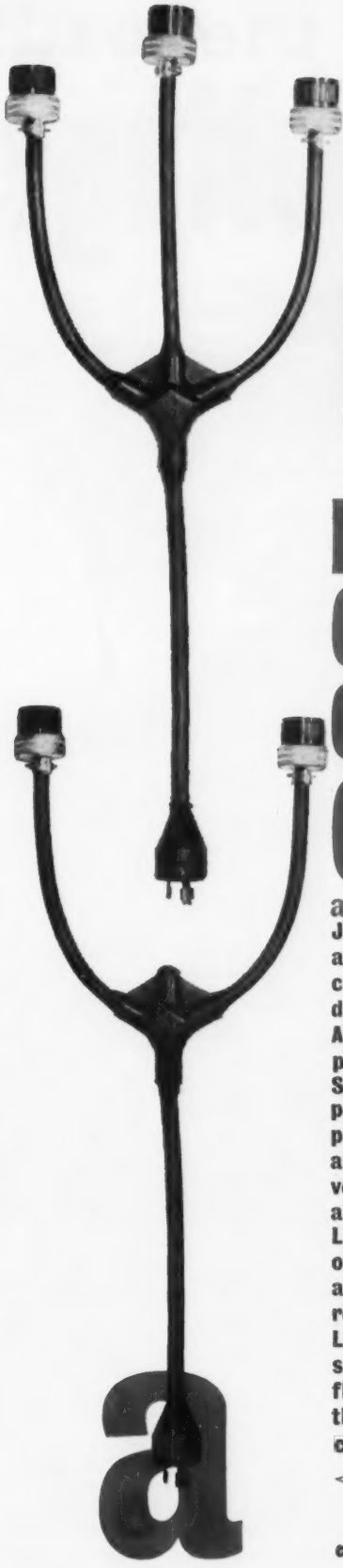

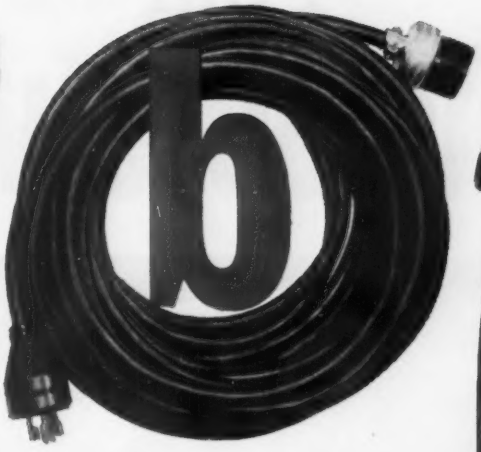

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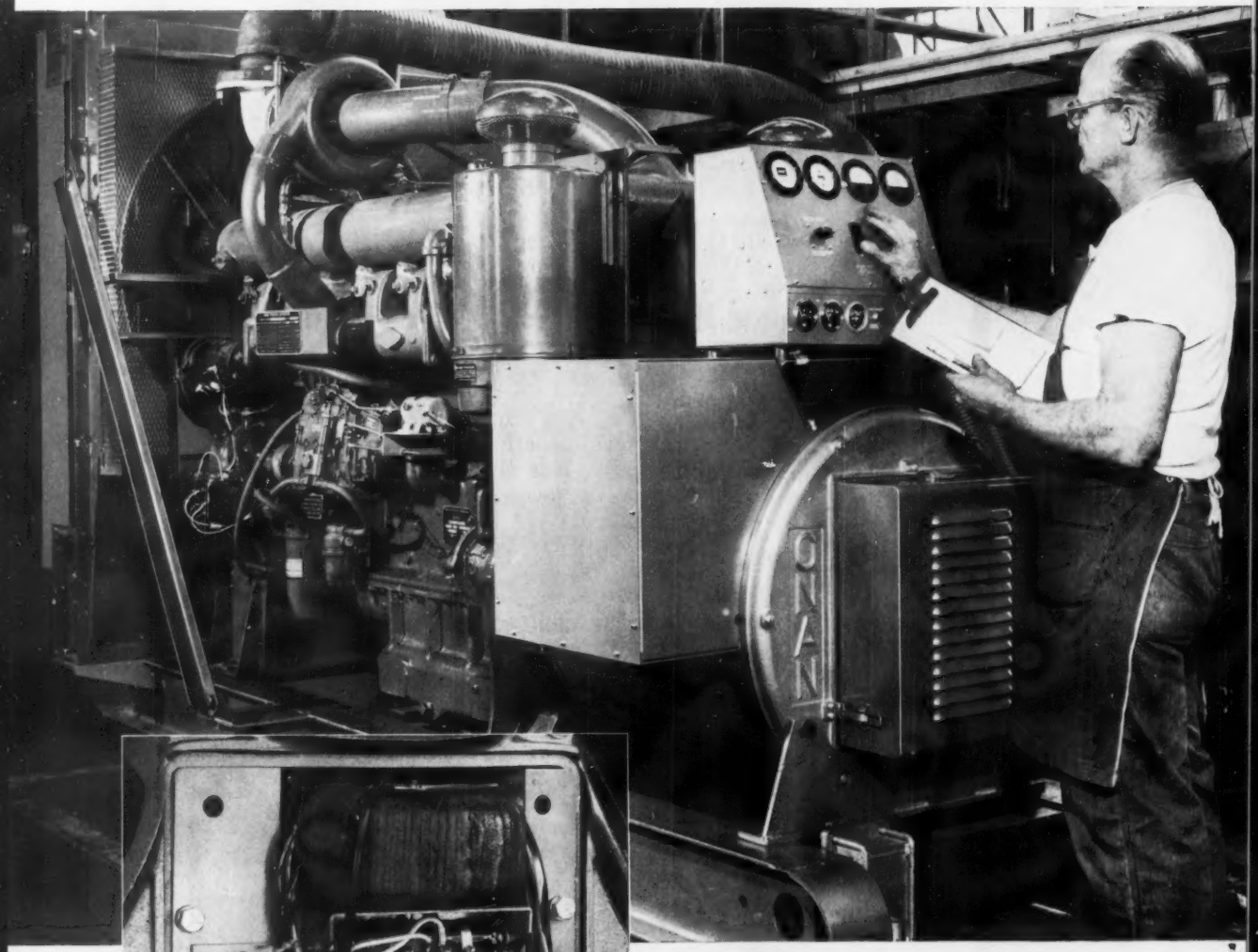

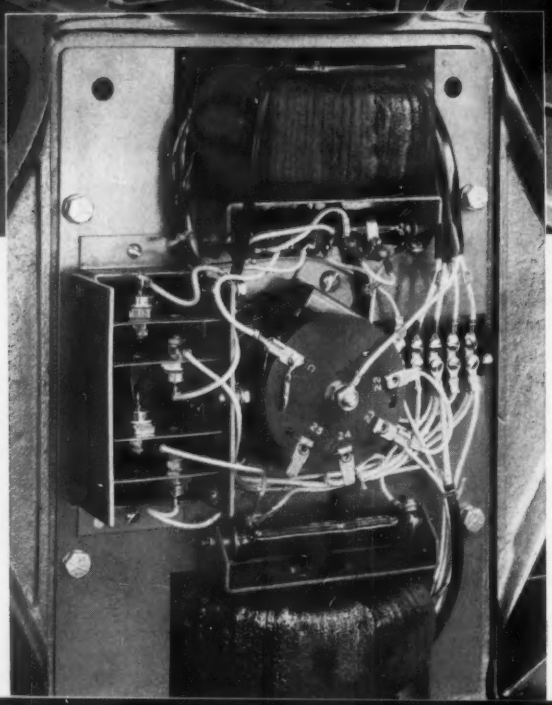

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"Concealed telephone wiring is helping me sell homes"

Telephone man Mason Layton checks concealed telephone wiring and position for outlet in a Gardiner "Mission Ranch" home at Fremont, Calif.

SAYS EUGENE V. GARDINER
OF GARDINER CONSTRUCTION CO.,
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"I wouldn't think of building a home without concealed telephone wiring and convenient extra outlets," says Eugene Gardiner, head of his own construction company 35 miles southeast of San Francisco. "It's a definite built-in sales feature.

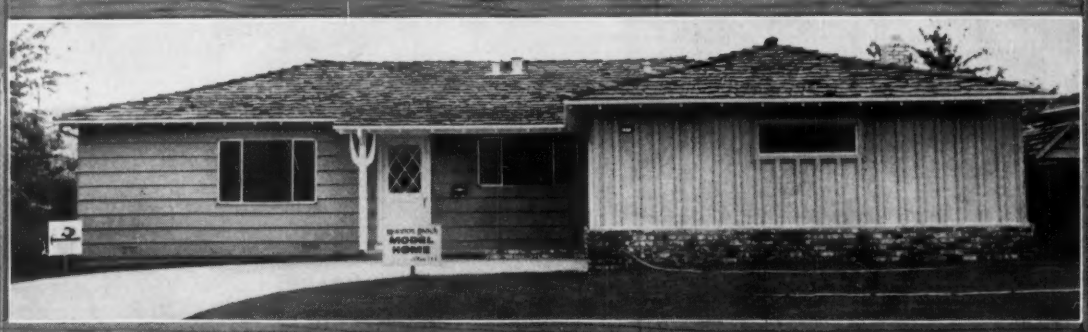
"At one time, concealed telephone wiring was considered a luxury by home buyers," says Mr. Gardiner, "but not now. People *demand* it. When they buy a modern home they expect modern accessories and conveniences . . . and that includes phone equipment."

Mr. Gardiner builds homes in the $20,000-to-$30,000 range. Each of his homes is equipped with telephone outlets. "We've telephone-planned our homes since 1957," says Mr. Gardiner, "and we intend to continue doing so. It's a profitable investment."

* * *

Your local Telephone Business Office will gladly help you telephone-plan your homes. For details on home telephone installations, see Sweet's Light Construction File, 11c/Be. For commercial installations, Sweet's Architectural File, 34a/Be.

BELL TELEPHONE SYSTEM



Sola indoor constant-wattage mercury-lamp transformers install easily, operate lamps down to 20° below zero

Now you can insure that your indoor mercury lighting installation will start and keep going even when temperatures slip far below zero. No longer is it necessary to use special, premium-priced indoor transformers or the still more costly weatherproof outdoor type for low temperature indoor installations. Sola's new standard line of indoor constant-wattage mercury lamp transformers keeps H-1, H-25, and H-33 lamps working down to minus 20°F. Two-lamp and single lamp units are both available for these input voltages: 115, 208, 230, 277, 460, and 575. They are ideal for shed, dock and warehouse installations as well as indoor remote mounting to serve outdoor mercury circuits.

These indoor transformers have new, lighter-weight core and coil construction for easier handling. Long leads and twelve knockouts in the new-designed case permit quick and easy connection. The case is liberally perforated for plenty of air circulation around the core and capacitors to give cool, trouble-free operation.

Listed by Underwriters Laboratories, the new indoor transformers incorporate the well-known Sola constant-wattage circuit which gives you these performance benefits:

Low starting current—limits current during warm-up, eliminates need for heavy wiring and time-delay relays, and permits more lamps to operate on the lighting circuit.

Maintained light output — holds lumen output constant within ±1% for line voltage changes as great as ±13%.

Open and short circuit protection — prevents transformer and wiring from overheating.

Insures rated lamp life — reduces premature lamp failure by providing stable operating conditions.

No dropout when line voltage dips — eliminates lamp dropout even when voltage dips 30% from nominal.

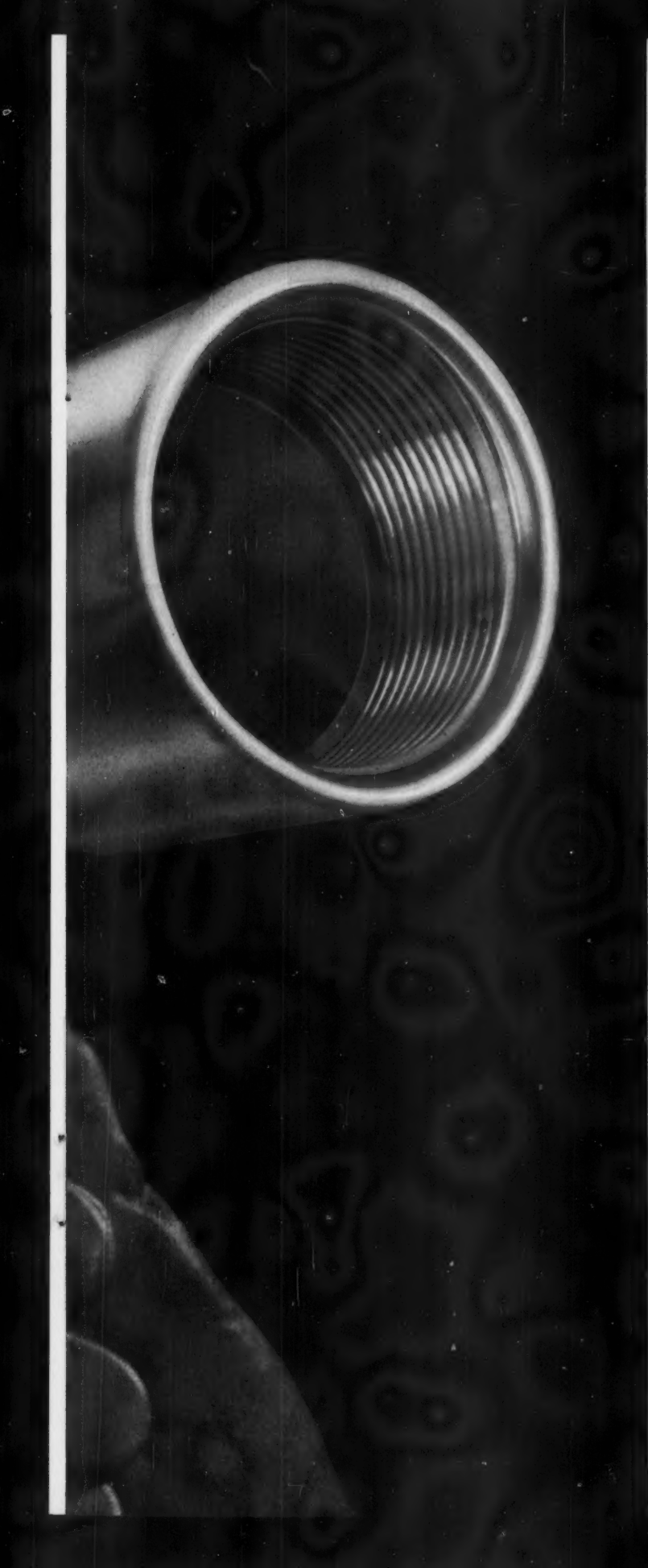
For information, write for Bulletin MVI

SOLA
A DIVISION OF BASIC PRODUCTS CORPORATION
BPC

SOLA ELECTRIC CO., Busse Road at Lunt, Elk Grove, Illinois

IN CANADA, Sola-Basic Products Ltd., 377 Evans Avenue, Toronto 18, Ontario

ALCOA
ALUMINUM
CONDUIT
RIGID CONDUIT



Light weight!

One reason why Alcoa aluminum electrical rigid conduit costs less to install

Heft a 10-foot length of 4-inch aluminum conduit. It weighs just 34 pounds. Compare this with 98 pounds for a similar section of steel conduit.

You benefit from this weight advantage in every phase of handling—lifting, loading, carrying, erecting. Result? Jobs go up faster.

You'll also find that aluminum conduit is easier to cut, bend and thread than conventional conduit. A hacksaw is adequate for cutting most sizes; bending usually is a one-shot task; and regular dies and cutting oils give you clean, sharp threads in a hurry.

Aluminum conduit is nonsparking, nonmagnetic, corrosion-resistant, and nontoxic. It looks good when you put it up and stays that way for years and years.

Get all the facts and figures in time for your next job. Contact your electrical distributor or one of our representatives. Or drop us a line for free literature. Write to Rome Cable Division of Alcoa, Dept. 7-90, Rome, New York.

OTHER REASONS WHY it costs less to install Alcoa conduit: you can cut it easily with a hacksaw, bend with an EMT bender, and thread quickly with a regular sharp die.

ROME CABLE
DIVISION OF **ALCOA**

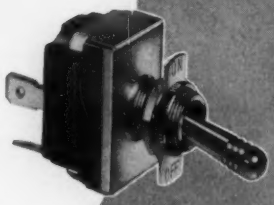
For over fifty years, McGill's insistence on superior design and craftsmanship, scientific testing technique, and quality materials has meant *dependability* to users of electrical specialties. McGill continues to serve the changing needs of industry —with quality products such as these . . .

UNCONDITIONALLY GUARANTEED NO. 41 LEVOLIER® SWITCHES

McGill makes the only switch of its kind with an unconditional guarantee against failure in lighting circuits. The Levolier Switch is available for many lighting and power applications, in single-pole, single and two-circuit models with pull-chain, lever and push-button operations. From 3 to 20-amp. Underwriters Laboratories, Inc. inspected.

SPECIFY McGILL® BETTER-BUILT LONGER-LASTING

QUALITY *Levolier*® SWITCHES



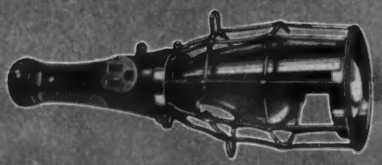
NEW DP MODEL LEVOLIER® TOGGLE SWITCHES

You can depend on McGill Toggle Switches for precision operation of motors, power tools, control panels, and countless other applications. Choose from a long line of SP and DP, two-circuit and three-way models. Choice of terminals, lever colors, circuitry arrangements. 6 to 20 amps. Underwriters Laboratories Inc. inspected.

LAMP CHANGERS — BROKEN LAMP BASE REMOVER

McGill lamp changers make lamp changing safe and easy. Available in a variety of heads for lamp bulbs of any size or shape. Broken lamp base remover avoids danger from shock or broken glass. Insulated poles, with or without angle adjustment, fit lamp changer or broken lamp base remover heads.

. . . AND PORTABLE LAMP GUARDS



NO. 5000-SLRG. GROUNDED GUARD

- Non-conductive molded phenolic handle
- 3-wire convenience outlet
- 2 cage designs

3000 SERIES VAPORPROOF GUARDS

- Watertight, dust-tight, moisture-proof
- Fiber, steel, copper cages

Write for full information. McGill catalog 84 will provide you with full details and specifications for these and many other electrical specialties by McGill.

engineered electrical products

McGILL®

precision needle roller bearings

McGILL MANUFACTURING COMPANY, INC., ELECTRICAL DIV., 450 N. CAMPBELL ST., VALPARAISO, INDIANA

NO SERVICE PROBLEM HERE...

Exclusive with

UNIVERSAL *"Service Guaranteed"* BALLASTS

For years, UNIVERSAL has been paying the bill for the replacement of in-warranty inoperative fluorescent ballasts. These payments are a direct part of the *exclusive* and *comprehensive* UNIVERSAL Two Year Warranty Service Program with (T)(E)(S)*. Architects, engineers, contractors, distributors, fixture manufacturers and maintenance personnel are *all* relieved of the burden of service.

Should you be confronted with a lighting failure which appears to be abnormal, regardless of the number of ballasts involved, you are requested to telephone UNIVERSAL — COLLECT — and ask for (T)(E)(S)*. *Within 24 hours* of your phone call, one of our field engineers will visit your installation. Assuming that our technical people determine that the lighting failure stems from ballasts which are being used in proper application, UNIVERSAL will arrange for the replacement of those ballasts and pay all charges in connection with the replacements, *including labor*. This is made possible by the high quality performance of UNIVERSAL "Service Guaranteed" BALLASTS in millions of fluorescent fixtures everywhere. *A fine product can afford a fine guarantee.*

You owe it to your own peace of mind to get the full details on this program. MAIL THIS COUPON FOR DESCRIPTIVE BROCHURE.

**Technical Engineering Service*

The only complete service program in the ballast industry!

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MANUFACTURING CORPORATION

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THE LARGEST INDEPENDENT MANUFACTURER OF FLUORESCENT TRANSFORMERS IN THE UNITED STATES

UNIVERSAL MANUFACTURING CORPORATION Dept. ECM
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Please send me your brochure describing UNIVERSAL's EXCLUSIVE (T)(E)(S) (Technical Engineering Service) PROGRAM.

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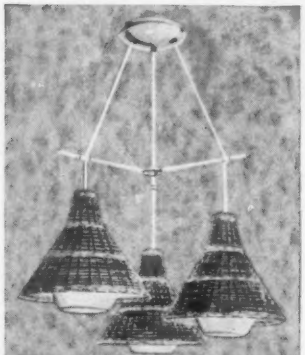
☐ Architect ☐ Distributor ☐ Maintenance Man
☐ Engineer ☐ Fixture Mfr. ☐ Builder
☐ Contractor ☐ Equipment Mfr. ☐ Other

the light idea®

SUN 'N SAND Unique, different . . . appealing! Shades are an arresting blend of imported Italian sand-tone reed, handwoven with glistening brass accents. Satin white, diffusers. Sun 'N Sand — original . . . beautiful . . . modern!

V-5675 For hallways or tasteful accent lighting. Length 8¼", diameter 6½". One 100-W.



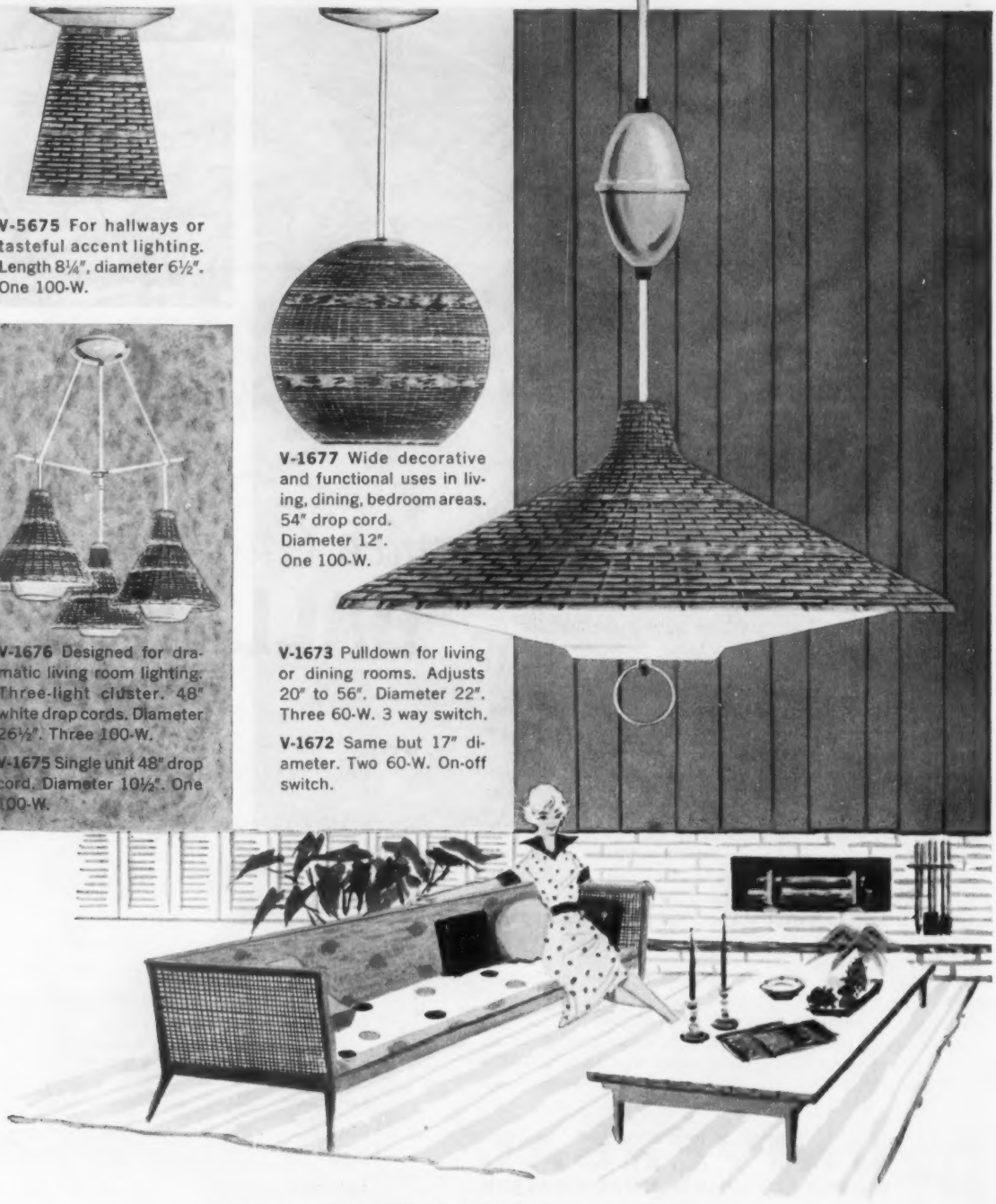
V-1676 Designed for dramatic living room lighting. Three-light cluster. 48" white drop cords. Diameter 26½". Three 100-W.

V-1675 Single unit 48" drop cord. Diameter 10½". One 100-W.

V-1677 Wide decorative and functional uses in living, dining, bedroom areas. 54" drop cord. Diameter 12". One 100-W.

V-1673 Pulldown for living or dining rooms. Adjusts 20" to 56". Diameter 22". Three 60-W. 3 way switch.

V-1672 Same but 17" diameter. Two 60-W. On-off switch.

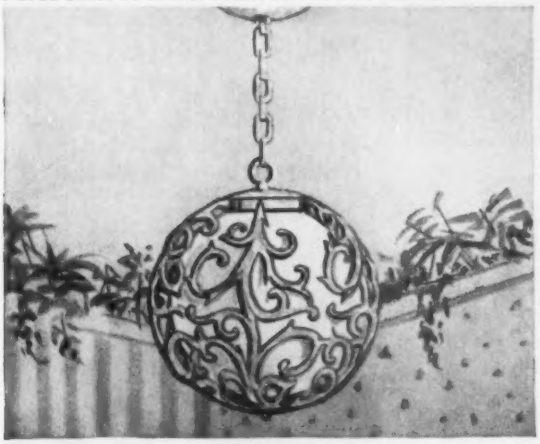


new custom creations

FLORENTINE SERIES Exquisitely detailed scrolls cast in aluminum. Antique white color delicately toned with gold fleck. White opal globes. Matching white chain. Here is new richness for all homes — contemporary, transitional, traditional!

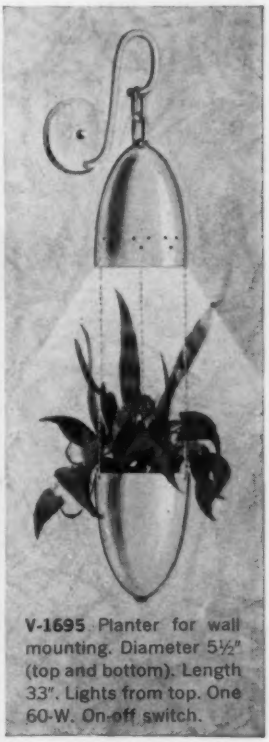
V-1713 Perfect in foyers, living rooms, dining areas. Spread 31" (6' chains and yolk). Three 100-W.

V-1712 Diameter 12". Matching white 6' drop chain. One 150-W.
V-1710 Same as above: Diameter 10". One 100-W.



PLANTER SERIES Bright ideas! Lighting fixtures that double as planters. Perfect accents for fireplace, entranceways, in dinettes or family rooms . . . wherever you want a touch of eye-catching beauty!

V-1690 Polished brass. Diameter 15⅜". Length 36". Lights from top. Three 60-W. 3 way switch.



V-1695 Planter for wall mounting. Diameter 5½" (top and bottom). Length 33". Lights from top. One 60-W. On-off switch.

These are just a few of the fresh, new custom creations available... fixtures so delightfully different and irresistibly styled... "to show is to sell." Free colored brochure describing the full line available. See your nearest Virden Lighting distributor or write direct using the coupon below.

VIRDEN LIGHTING

MEMBER AMERICAN HOME LIGHTING INSTITUTE

VIRDEN LIGHTING DEPT. ECM-9
DIVISION OF JOHN C. VIRDEN COMPANY
5209 EUCLID AVENUE
CLEVELAND 3, OHIO

Name_____

Address_____

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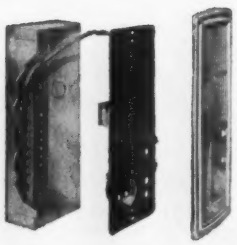
SUBSIDIARIES: LIGHTING DYNAMICS, INC., LOS ANGELES, CALIF. AND DALLAS, TEXAS; JOHN C. VIRDEN, LTD., TORONTO, ONTARIO.

NEW... most beautiful Apartment Telephones ever made!

- Equipped with cordless loudspeaker or watchcase receiver—your choice
- Modern, slim, streamlined design
- Aluminum face plate with beautiful anodized finish in brushed gold or silver
- Plug-and-receptacle installation
- Easiest telephone in the world to install and maintain
- Excellent voice reproduction
- Competitive price
- Pleasant-sounding audible signal
- Flush, semi-flush or surface wall mounting

Auth vestibule and lobby telephones also have been re-designed and are the last word in appearance and efficiency. Get complete facts today.

Apartment and vestibule telephones illustrated are cordless loudspeaking type. Also available are apartment telephones with watchcase receiver as indicated.



Exploded view of cordless loudspeaking telephone

Watchcase receiver type

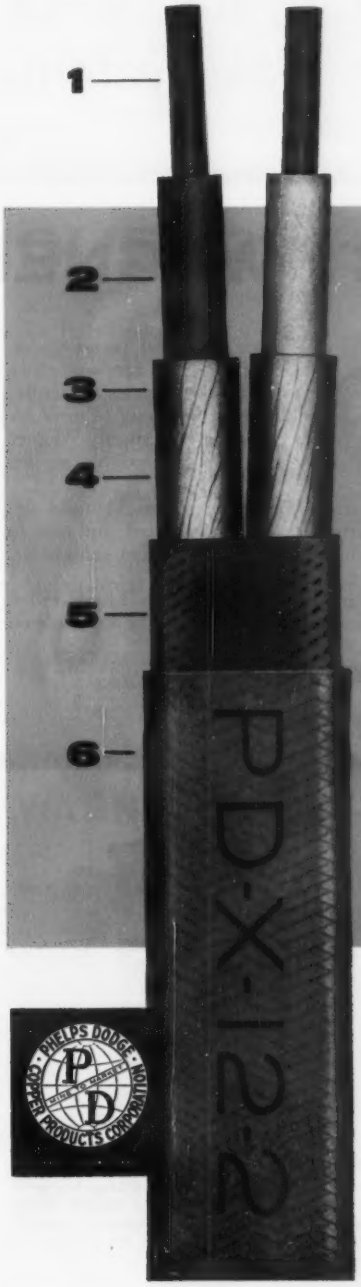
Auth
SINCE 1892

ELECTRICAL SIGNALING, TIME AND COMMUNICATION SYSTEMS FOR HOSPITALS, SCHOOLS, HOUSING, INDUSTRY AND SHIPS

Auth Electric Company, Inc.
LONG ISLAND CITY 1, NEW YORK

Contractors agree...

You can't beat Phelps Dodge Dependable PD-X Cable for fast, easy stripping!



Habirshaw type NM nonmetallic-sheathed cable saves vital on-the-job time and money!

Phelps Dodge Copper Products Corporation's PD-X cable is the fastest-stripping, cleanest-working nonmetallic-sheathed cable on the market today. Here's why:

1. Copper conductors are *soft* drawn. Connections are easily and quickly made.
2. Habirdure Thermoplastic Insulation is clean and smooth —makes stripping *simple, easy,* fast.
3. Paper armor is resin-treated to resist moisture, is clean and dry—no oil, grease or wax is used.
4. Paper armor is applied with a long twist and can be removed by an easy flick of the fingers. No time-wasting unwinding, no sticking to underlying insulation.
5. Barrier tape keeps finishing compounds out of the cable —leaves inside clean and free of gum. *Strips off cleanly as a unit with outer braid covering.*
6. Clean, grey finish eliminates sticking, *assures easy pulling,* clean walls and hands.

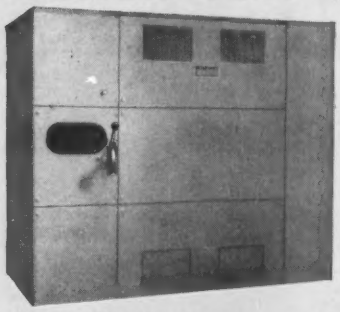
See Your Phelps Dodge Distributor!

PHELPS DODGE COPPER PRODUCTS CORPORATION

SALES OFFICES: Atlanta, Birmingham, Ala., Cambridge, Mass., Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Dayton, Denver, Detroit, Fort Wayne, Greensboro, N. C., Houston, Indianapolis, Jacksonville, Kansas City, Mo., Los Angeles, Memphis, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Ore., Richmond, Rochester, N. Y., San Francisco, St. Louis, Seattle, Tampa, Washington, D. C.

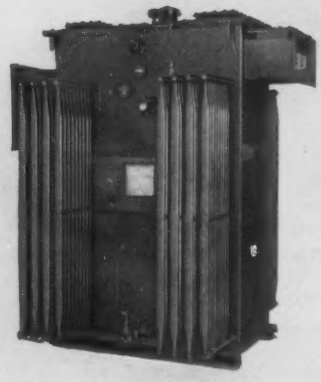
WAGNER UNIT SUBSTATION TRANSFORMERS

112½ to 2000 Kva—three phase, 60 cycles, 15 KV and below



VENTILATED DRY-TYPE—For indoor installation in reasonably dry, dust-free, well ventilated locations. Light in weight, ideal for multi-story buildings. No fireproof vaults required. Insulated for 80°C temperature rise.

for your plant's electrical system...



OIL-FILLED—Generally installed outdoors. Can be used indoors in fireproof vaults. Outdoor transformers can be connected to indoor switchgear using weather-proof bus-duct. 55°C rise, self-cooled or forced-air cooled.

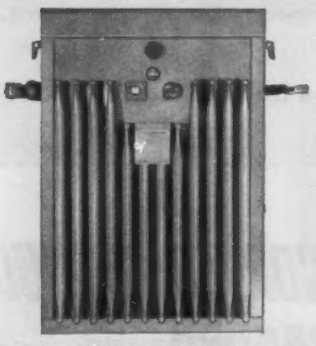
SELECT WAGNER

There's a complete line of Wagner Industrial Transformers. One or more of them will fit your specific needs whether you're planning a new plant distribution system, modernizing your present one, or adding to its capacity to meet increasing demands for power. So, select and specify Wagner Transformers. They'll give you long, dependable service because:

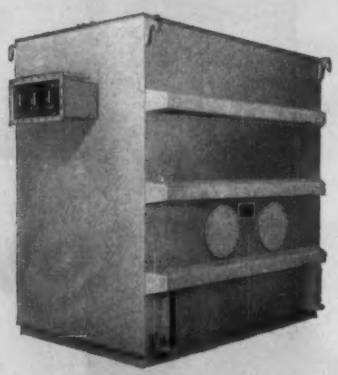
All Wagner Industrial Transformers are liberally designed, sturdily constructed, thoroughly tested, and able to meet the heaviest industrial demands. You get continuous, dependable power for years.

For your main plant substation, Wagner Liquid-Filled Industrial Power Transformers are available in standardized ratings through 10,000 Kva.

Load centers? Wagner makes PREDESIGNED Unit Sub-

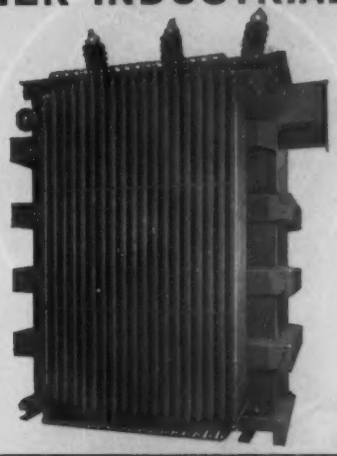


NOFLAMOL—Non-inflammable liquid-filled. For indoor or outdoor installation, especially suited for chemical plants, refineries and similar locations where explosive liquids or gases are present. The close-coupled design fits flush against switchgear enclosures to save space. Throat connected designs are also available. 55°C rise, self-cooled or forced-air cooled.



SEALED DRY-TYPE—Hermetically sealed in welded steel cases to provide positive protection from contamination, fire and explosion hazards. Sealed tank is filled with inert nitrogen. Only maintenance needed is periodic checking of gas pressure. Can be safely installed in any load center.

WAGNER INDUSTRIAL POWER TRANSFORMERS



Oil-filled, for outdoor installations, available through 10,000 Kva, 67 KV and below.

Noflamol, non-inflammable liquid-filled for explosive atmospheres, available through 7,500 Kva, 15 KV and below.

The performance stability of Wagner Industrial Power Transformers is outstanding. Quality is designed and built into these transformers by specialists with years of transformer engineering and production experience. Highest quality materials . . . carefully controlled production methods . . . constant inspections and tests make sure these transformers give in-service performance that means better service for your system.

INDUSTRIAL TRANSFORMERS

station Transformers to meet your particular requirements. Furnished with suitable incoming line sections, these transformers will save you time and job engineering costs. And, you can specify the secondary switchgear you prefer.

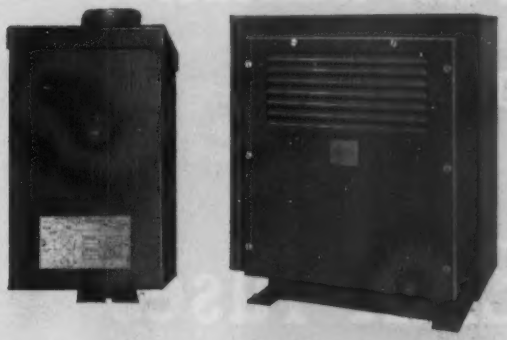
Wagner Dry-Type Distribution Transformers are an economical choice for plant areas requiring 120/240 volts, single-phase or 208Y/120 volts three-phase.

Over 65 years of constant research and development has made Wagner a leader in transformer design . . . made the name Wagner one of the foremost in power planning. For expert advice on your present and future plant transformer needs, call or write the Wagner branch near you.

get economical, dependable, power packages!

Wagner Electric Corporation
6413 PLYMOUTH AVE., ST. LOUIS 33, MO., U. S. A.

WAGNER DRY-TYPE DISTRIBUTION TRANSFORMERS



Single-phase 1 to 100 Kva—Three-phase 3 to 300 Kva—600 volts and below.

These dry-type distribution transformers have a low sound level, are compact and light in weight. They meet all safety requirements for indoor installation. They are economical to maintain . . . have no liquids, valves, gaskets or gauges.

Totally-enclosed non-ventilated dry-type transformers can be installed indoors or outdoors. Ventilated units as shown in right hand photo are for indoor installation only. Ratings through 10 Kva single-phase are filled with an epoxy compound . . . operate quiet as a whisper . . . perfect for areas where noise would be a nuisance. They, and three-phase units through 30 Kva are designed for wall mounting . . . other ratings for floor or platform mountings.

Available for high voltages of 120 x 240, 240 x 480, 480 and 600 volts to 120/240 volts single-phase, and 480 and 600 volts to 208Y/120 volts three-phase.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

WT60-9

For fuses with 200,000 ampere interrupting capacity...

***plus,* extreme current-limitation**

plus,* time-lag to prevent needless blows – *you need...

Buss LOW-PEAK fuses

A Revolutionary New Protective Device

Buss LOW-PEAK Fuses are designed to meet modern demands for electrical protection.

They safely interrupt fault currents up to 200,000 amperes . . . limit let-thru current to exceptionally low values . . . and hold 500% load for minimum of ten seconds.

Protect Mains, Feeders, Branch Circuits, Motors, Controllers, Switches—no matter whether the fault current is 1,000 amperes, 25,000, 100,000—or as high as 200,000 amperes.

Reduce stresses and prevent damage to Panelboards, Switches, Motor Controllers—other circuit components—because let-thru fault currents are limited to exceptionally low values.

Can be easily co-ordinated into a selective system—to limit fault outages to circuit of origin.

Prevent work stoppages, lights out, waste of time and money—because long time-lag keeps them from opening needlessly on motor starting currents or other harmless overloads.

Permit increasing interrupting capacity and current limitation on present electrical system at minimum cost. Buss LOW-PEAK Fuses fit standard switches and panelboards. Available from 15 to 600 amperes in both 250 and 600 volt ranges.

Guard motors against burnout from single phasing and overloads.

Low operating temperature reduces heating in switches and panels.

Provide thermal protection for equipment against damage due to poor contact.

Protect against waste of space and money by permitting the use of proper size switches and panels.

Remain safe throughout the years without maintenance or recalibration.

▼

Write for Buss LOW-PEAK Bulletin Now . . . or use coupon.

BUSSMANN MFG. DIVISION,
McGraw-Edison Co.
St. Louis 7, Mo.

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Bussmann Mfg. Division, McGraw-Edison Co.
University at Jefferson, St. Louis 7, Mo.
Please send Buss LOW-PEAK Fuse Bulletin LPCS.

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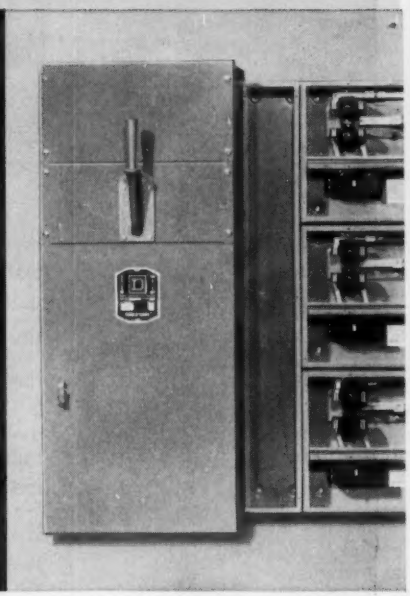
Title .....

Company.....

Address.....City.....State.....

ECM-960

new Square D E-Z STACK



easy as hanging a picture...

and in stock at authorized distributors

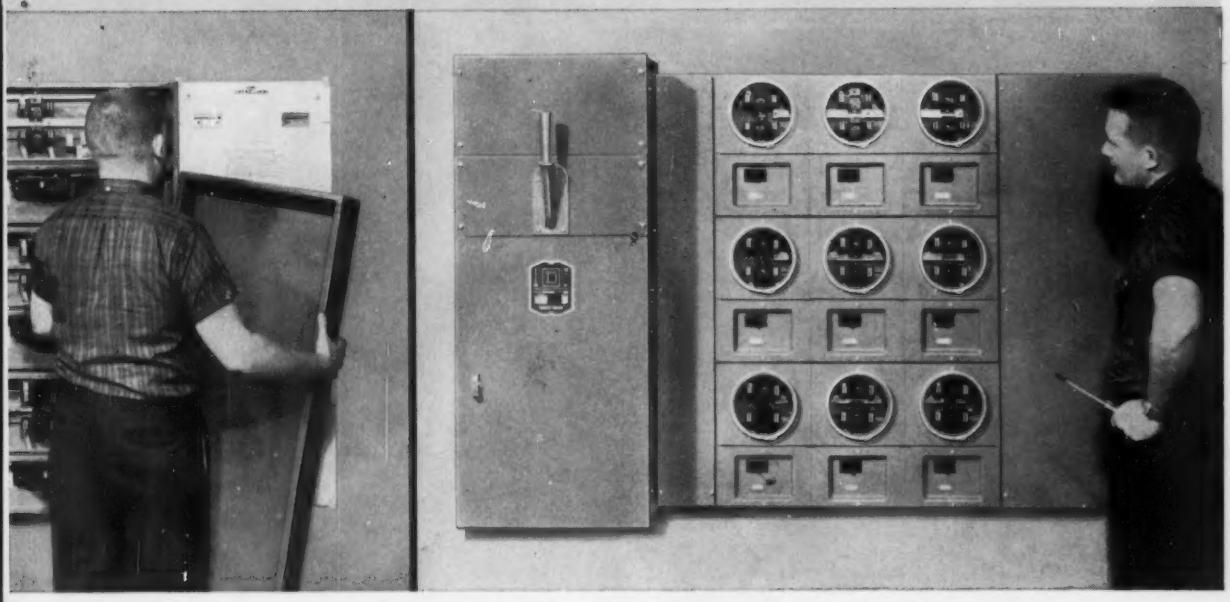
PLAN YOUR OWN ARRANGEMENT — Available wall space for the service and grouping of meters is frequently limited — and of a particular size and shape. Required locations of service and load conduits vary with each job. With E-Z STACK you have freedom of arrangement.

TEMPLATE LAYOUT — For installation convenience E-Z STACK devices include a full size template and wall mounting hanger brackets. Templates, attached to the wall, accurately position the hanger brackets for each device. Brackets on the wall interlock with clips on the back of the device.

AVAILABILITY — All E-Z STACK devices can be ordered by catalog number from authorized Square D Distributors *as they are needed.* Individually cartoned, the final decision as to the meter arrangement and size of the circuit breaker disconnect for

SQUARE D COMPANY

Apartment Metering Panels

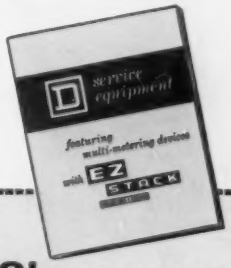


each apartment can be determined at the Distributor's counter.

MAN-POWER — Unit assembly of the final configuration permits easier handling of all components. The wall brackets support each unit — in its proper place — while permanently securing and inter-connecting the entire installation.

WE CALL IT E-Z STACK BECAUSE — the basic meter-breaker devices easily stack one on top of the other. All devices are "meant for each other" — and bracket suspended. Knockouts in adjacent devices line up; bushings protect inter-connecting wiring. Load lug assemblies in disconnects and service entrance terminal boxes are pad-mounted in the right quantity for every E-Z STACK installation. All devices are designed for a specific purpose—multiple-metering installations.

Underwriters' Laboratories Approved



GET ALL THE FACTS! Send for new Service Equipment Bulletin No. SL-27 featuring E-Z STACK design multi-metering devices, a complete cataloging of features, specifications, suggested arrangements, and bills of material.

SQUARE D COMPANY • c/o Department SA-151
Mercer Road, Lexington, Kentucky

NAME_____

COMPANY_____

ADDRESS_____

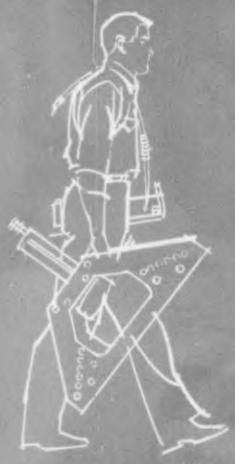
CITY_____ ZONE_____ STATE_____

wherever electricity is distributed and controlled

ANNOUNCING . . . the

LIGHTEST

and most powerful 4″ segment bender on the market



See this bender demonstrated at the NECA SHOW, October 24-26, 1960— BOOTH 155-157

Greenlee No. 777

(1-1/4″ thru 4″)

weighs only 65 lbs.

(exclusive of shoes)

COMPARE THESE IMPORTANT ADVANTAGES . . .

FEWER PARTS

one-piece frame of high-strength aluminum
one set of aluminum pipe supports for all pipe sizes
one set of safe, quick-locking pipe support pins.

THREE BENDERS IN ONE

a few optional parts adapt the No. 777 segment bender to fast, one-shot 90° bending 1/2″ thru 2″ and thin-wall bending 3/4″ thru 2″.

SAFE, ONE-MAN OPERATION

safety valve in pump, oil by-pass in ram, weighs only 65 lbs. excluding bending shoes.

Unmatched for over-all performance, the new Greenlee No. 777 does more jobs for you than any other bender of its type. Use it to make offsets . . . large sweeps . . . concentric bends . . . one-shot 90° bends . . . thin-wall bends.

Its 27-ton ram has power to spare for segment bending of steel or aluminum conduit and pipe 1-1/4″ thru 4″ — will bend extra heavy schedule 80 pipe. Comes equipped with a hand hydraulic pump, but can be operated with power pump for even faster performance.

OPTIONAL EQUIPMENT FOR ONE-SHOT AND THIN-WALL BENDING

One shot 90° bending 1/2″ thru 2″

90° bends in one shot An important *exclusive* advantage you get with this new, light-weight GREENLEE segment bender. Simply by adding bending shoes and adapter, you can make any bend up to 90° in 1/2″ thru 2″ conduit or pipe in *one shot!*

Thin-wall bending 3/4″ thru 2″

Quickly mounted thin-wall attachment The No. 777 segment bender can be quickly and economically converted to bend thin-wall conduit 3/4″ thru 2″. Standard No. 770 thin-wall attachments fit the No. 777 bender with only the addition of one roller.

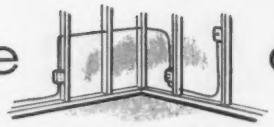
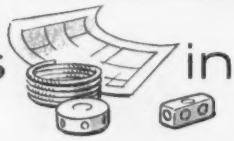
ASK YOUR DISTRIBUTOR FOR A DEMONSTRATION NOW! Write for bulletin E-249

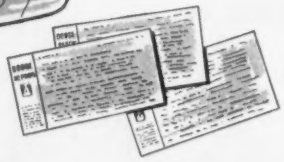
GREENLEE TOOL CO., 1937 Columbia Ave., Rockford, Illinois

TOOLS FOR CRAFTSMEN

GREENLEE JOB-PROFIT TOOLING

. . . cost control for contractors

Want a bigger share  of the new electrical contracts  in your area?

Want to be sure you're not missing good bidding opportunities? Want a reliable way to size up jobs...to go after the ones that will do you most good ? You need daily Dodge Reports  ! !

DODGE REPORTS are individual building project reports. They're mailed to you daily. You get **REPORTS** on just the types of building you're interested in—in the area where you do business. They tell who's going to build what and where . . . whom to see . . . when bids are wanted . . . who else is bidding . . . who gets which awards.

When you use **DODGE REPORTS**, you always know what's coming up. You don't depend only on invitations to bid. You concentrate on jobs you *know* will be profitable.

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Send me the book: "How Subcontractors Get More Work in New Construction" and let me see some typical Dodge Reports for my area. I am interested in the general markets checked below.

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Company_____

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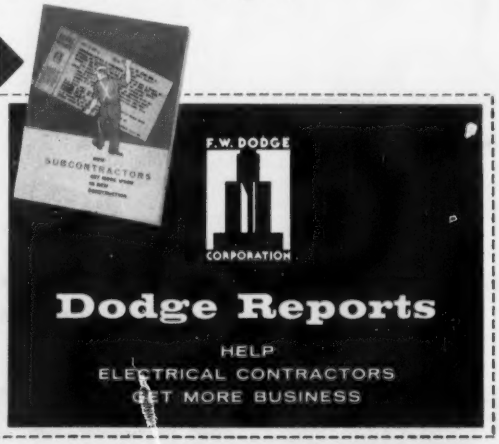
City_____ Zone_____ State_____



EH G g JK TJ TJK eh K F jk LM NF tef
NE NM TEF KL TKL LM EH TJ jkl EH k
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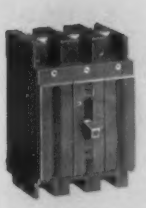
F JK LM NF Mm tef EH JKL G eh JK TJ
K EH tjk JK NF LM F G TJK Mm KL nm
TJK JKL TJ G jk TKL NJ KL JK EH tjk

in specifying AB breakers the reign of confusion is over

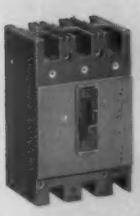
Westinghouse completely redesigns its breaker line

SIMPLE TO SPECIFY/EASY TO IDENTIFY

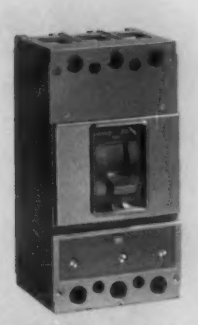
Newly designed breaker line simplifies frame designations . . . reduces space requirement up to 50%. Because of recent Westinghouse engineering advances, these new breakers retain the same high interrupting capacities of older designs in smaller frame sizes. The new designs mean it's easier for you to order, install and use AB breakers. Gone is the confusing assortment of letters that designate other models. These new breakers are easy to identify because they follow a common-sense sequence. They're simple to specify because you choose from only six breakers for virtually every application. They're better to use because they're smaller . . . yet you have the same quality and reliability of the former Westinghouse models you've been using.



E 15-100 amps, 240 volts a-c,
125 volts d-c, 1, 2 and 3 poles
IR @ 240 volts a-c: 7500 amps



FA 15-100 amps, 600 volts a-c,
250 volts d-c, 2 and 3 poles
IR @ 240 volts a-c: 20,000 amps
Replaces: EH, F and G breakers
Check Westinghouse for availability
of this newest breaker.



JA 70-225 amps, 600 volts a-c,
250 volts d-c, 2 and 3 poles
IR @ 240 volts a-c: 25,000 amps
Replaces: J breakers

KA 70-225 amps, 600 volts a-c,
250 volts d-c, 2 and 3 poles
IR @ 240 volts a-c: 30,000 amps
Interchangeable Trip
Replaces: JK and K breakers

LA 125-400 amps, 600 volts a-c,
250 volts d-c, 2 and 3 poles
IR @ 240 volts a-c: 50,000 amps
Interchangeable Trip
Replaces: KL and JKL breakers

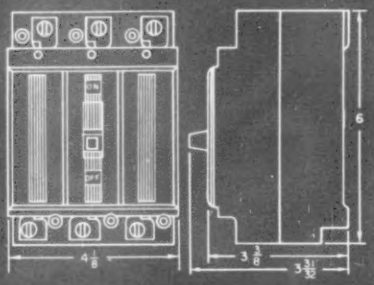
MA 125-800 amps, 600 volts a-c,
250 volts d-c, 2 and 3 poles
IR @ 240 volts a-c: 50,000 amps
Interchangeable Trip
Replaces: L, M and LM breakers

IR = Interrupting Rating

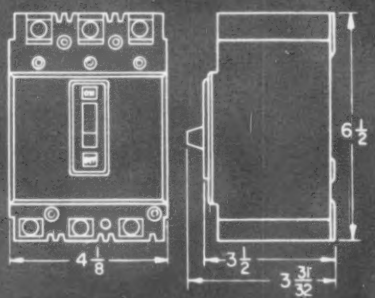
• Add the fact that terminals accept either copper or aluminum cable. Any way you look at it, the **NEW** Westinghouse line is the one you'll want to use from now on. • Want more information on this new line of breakers? Contact your Westinghouse representative, Westinghouse distributor, nearest independent panelboard-switchboard builder, or write Westinghouse Electric Corporation, Standard Control Division, Beaver, Pa. • We're offering a free wall chart that shows the new line of breakers. It measures 17 x 22 inches, is plastic coated and gives dimensions, interrupting ratings, maximum amps and volts and, of course, the newest designations along with the breaker photos. Write to the Westinghouse address above for your copy.

All Westinghouse AB breakers meet or exceed NEMA and UL specifications.

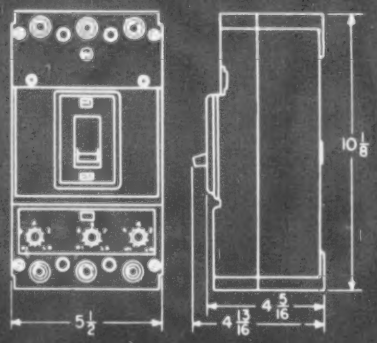
new breakers / new sizes / new designations



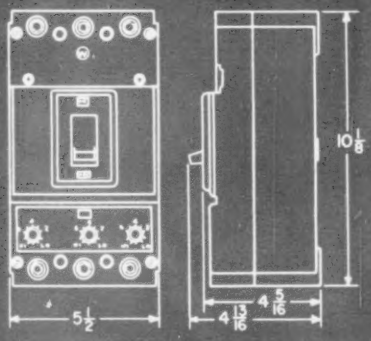
E 15-100 amps, 240 volts a-c.
IR @ 240 volts a-c: 7500 amps



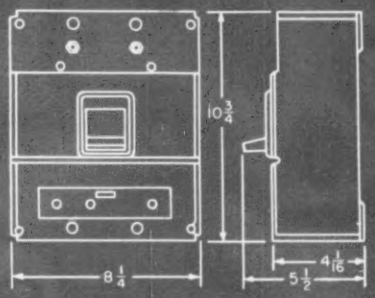
FA 15-100 amps, 600 volts a-c.
IR @ 240 volts a-c: 20,000 amps



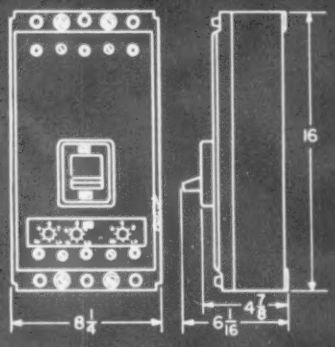
JA 70-225 amps, 600 volts a-c.
IR @ 240 volts a-c: 25,000 amps



KA 70-225 amps, 600 volts a-c.
IR @ 240 volts a-c: 30,000 amps



LA 125-400 amps, 600 volts a-c.
IR @ 240 volts a-c: 50,000 amps



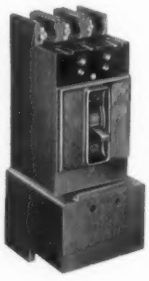
MA 125-800 amps, 600 volts a-c.
IR @ 240 volts a-c: 50,000 amps

IR = Interrupting Rating

a Westinghouse breaker for every application

SAF-T-VUE* . . . lets you see whether the contacts are open or closed. Fills the needs of every industrial plant where safety codes require visible contacts. All frames.

MARK 75* . . . interrupts up to 75,000 amps at 240 volts a-c. Costs a fraction of conventional high interrupting capacity breakers. Does not require reactors or fuses, is particularly suited for network systems.



TRI-PAC* . . . smallest, lowest cost protective device you can apply where 100,000 amps can be poured into faults. Example: network systems or those fed by large transformers.

THERMAL MAGNETIC . . . provides instantaneous opening on short circuits, yet permits harmless momentary overloads such as those encountered in motor starting and initial lighting surges. On sustained overload, the higher the current, the shorter the opening time. All frames.

AMBIENT COMPENSATED . . . ends nuisance tripping, and eliminates need for derating where elevated or changing temperatures are encountered. All frames.

MAGNETIC ONLY . . . provides short circuit protection only. Primarily used on motor circuits where overload protection is provided by other means. All frame sizes except E.

WESTINGHOUSE ELECTRIC CORPORATION Standard Control Division, Beaver, Pa.

*Trade Marks

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JI-30317

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help you bid profitably on intercom and sound systems

In today's big market for sound and intercom, Executone equipment is known for *highest standards of performance*. Hundreds of contractors are *also* discovering that they can put in a reputation-building Executone system at *lowest installed cost*. Here's why:

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● **COMPLETE CO-ORDINATED SYSTEMS** You get everything you need from one responsible source . . . proven equipment, wire specifically designed and color-coded for the system. One-source responsibility cuts paper-work, delays, confusion.

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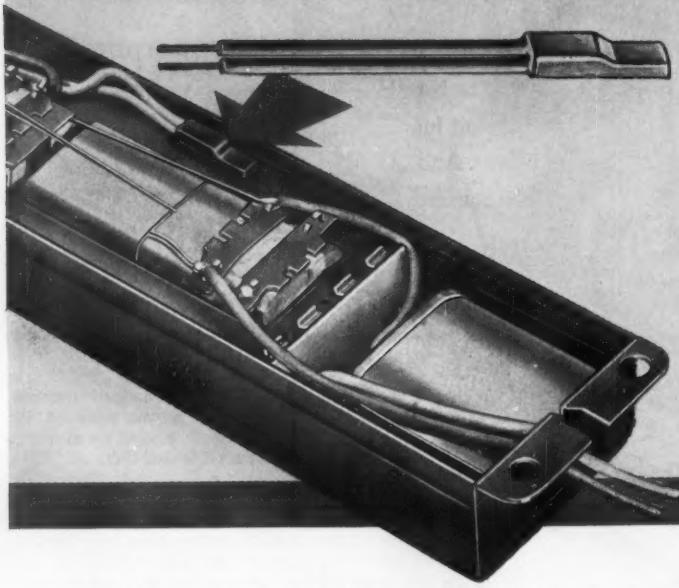
PROTECT FLUORESCENT LIGHTING INSTALLATIONS

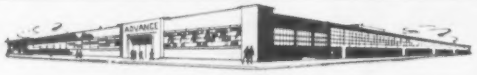
with ADVAN guard® FLUORESCENT LAMP BALLASTS



ADVAN-guard,® a thermally actuated automatic reclosing protective device, introduced by ADVANCE almost 3 years ago, is an integral part of every ADVAN-guard® Ballast. It is sensitive to voltage and current as well as temperature and protects against excessive voltage supply . . . internal ballast short circuiting . . . inadequate lamp maintenance . . . improper fixture application and eliminates the need for individual fixture fusing.

ADVAN-guard® is sealed in the ballast housing and pre-set to instantly and automatically trip out whenever the ballast is operating at higher than recommended temperatures. When heat decreases to normal operating temperature, ADVAN-guard® resets automatically and the ballast resumes operation, adding years to ballast life by preventing ballast operation at abnormal temperatures. To assure maximum protection for fluorescent lighting installations, provide ADVAN-guard® Fluorescent Lamp Ballasts. ADVAN-guard® is listed by Underwriters' Laboratories, Inc. Write for detailed literature.

"The Heart of the Lighting Industry"



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CBM CERTIFIED — World's Largest Exclusive Manufacturer of Fluorescent Lamp Ballasts

TRANSFORMER CO.

2950 NO. WESTERN AVE. CHICAGO 18, ILL. U.S.A.

Manufactured In Canada by: ADVANCE TRANSFORMER CO. Ltd., 5780 Pare St., Montreal, Quebec, Canada

This mark tells you a product is made of modern, dependable Steel.

Rigid steel conduit permanently protects circuit conductors against physical damage

So certain is this protection that the National Electrical Code includes the use of rigid steel conduit for all applications and locations—both inside and out. And, it *specifically* requires rigid steel conduit in particularly hazardous locations with explosive atmospheres.

Why? Because rigid steel conduit possesses great strength; provides a grounded metallic system, and cannot be damaged by moving objects. What's more, in case of a mishap due to faulty wiring, lightning, sudden shock or overloading, rigid steel conduit contains the damage and keeps it from spreading.

Rigid steel conduit is easy to install, too! It bends, threads and cuts with a minimum of effort. It is also compatible with all building materials, adaptable to all construction, fits anywhere and expands easily.

America's leading steel pipe manufacturer
supplying America's foremost conduit manufacturers.

TRADEMARK

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FPE
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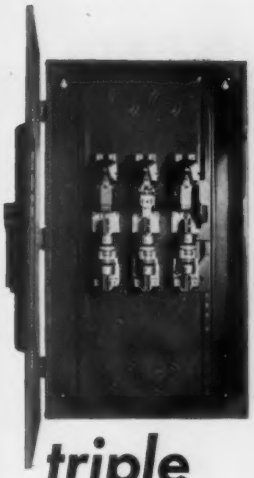


triple safety at your fingertips!

Only the Federal Pacific type A-plus switch gives you triple protection: the complete safety of visible blades, plus the high current capacity of a circuit breaker, plus the high interrupting capacity of fuses. And at the touch of the big Rotary Handle, fingertip operation opens and closes the A-plus switch instantly—with a quick-make, quick-break mechanism that is fast . . . teaseproof . . . safe. What's more, the A-plus switch is rated for load break, not just disconnecting duty! Feature for feature, there is no switch that compares with the A-plus safety switch. Federal Pacific heavy duty industrial switches are available in ratings 30 through 1200 amperes, 250 and 600 volts, indoor and weatherproof enclosures. Write for Bulletin 1241, Dept. FP-5, Federal Pacific Electric Company, Newark 1, N. J.

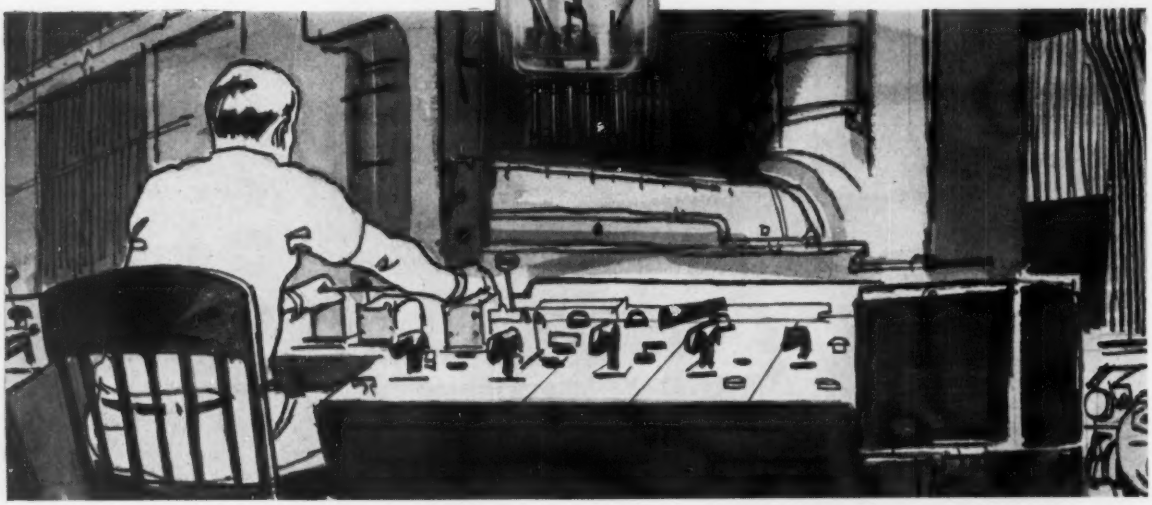
FEDERAL PACIFIC ELECTRIC COMPANY

FPE

growth through creative energy

SYLVANIA INDUSTRIAL TUBES

take the loads reliably



Sylvania Industrial Electronic Tubes prove their ability in daily use to withstand widely varying load conditions. Vibration? Shock? They're built to take that, too, and still perform reliably.

Next time you need superior-quality replacement tubes see your *Sylvania Industrial Tube Distributor*. Better yet, see him soon and have your replacements on hand. He handles the full line of Sylvania Industrial Tubes for resistance welding, electronic control, induction heating and dielectric heating equipment.

Meet your SYLVANIA INDUSTRIAL TUBE DISTRIBUTOR. Ask him for the new "Sylvania Industrial Tubes" and "Gold Brand Reliable Tubes" booklets. Or write Electronic Tubes Division, Sylvania Electric Products Inc.,Dept. 159,1100 Main Street, Buffalo, N. Y.

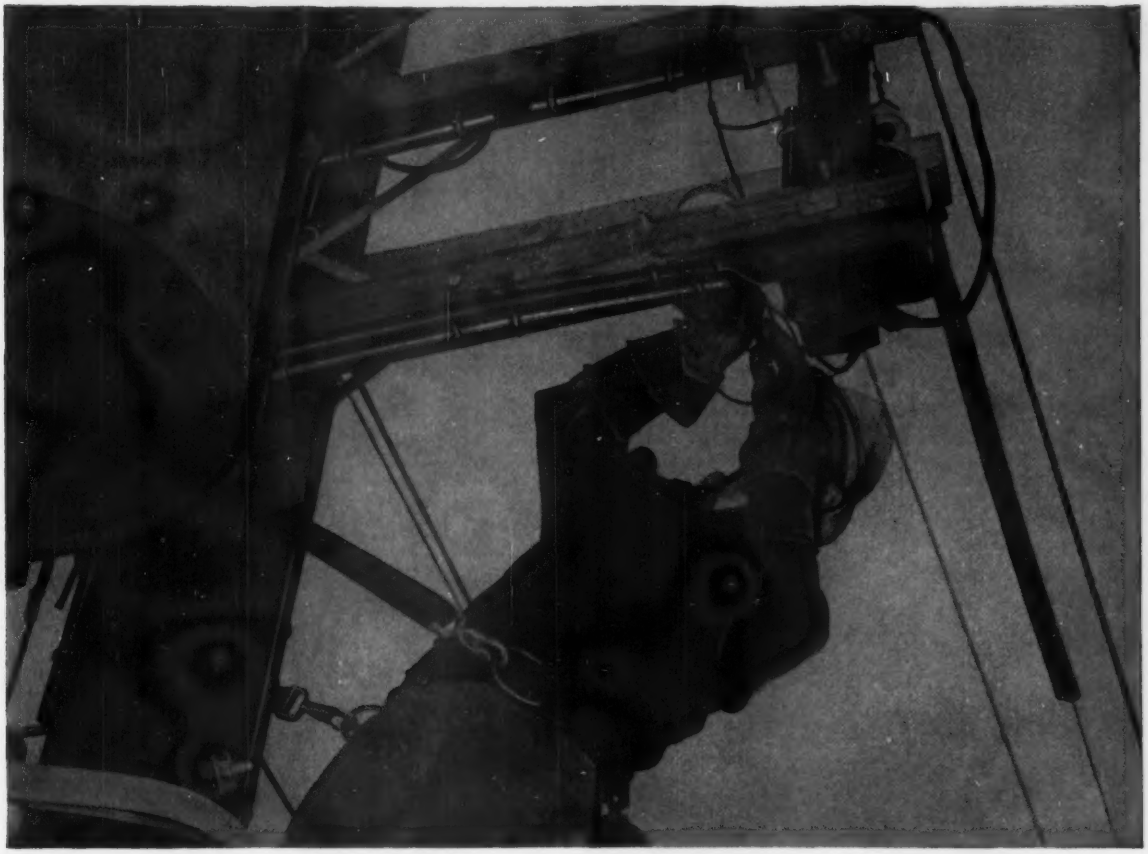
POPULAR SYLVANIA GAS TUBES FOR CONTROL APPLICATIONS

Sylvania Type	Starting Voltage	Operating Voltage	Operating Current (ma) Min.	Max.
VOLTAGE-REGULATOR TYPES				
OA2	155	150	5	30
OB2	115	105	5	40
OB3	125	90	5	30
OC3	135	105	5	40
OD3	180	150	5	40
5644	130	95	5	25
VOLTAGE-REFERENCE TYPES				
5651	115	87	1.5	3.5
6308	115	87	1.5	3.5

SYLVANIA

Subsidiary of **GENERAL TELEPHONE & ELECTRONICS**

Naugatuck KRALASTIC®



Here's why large East Coast utility chooses **KRALASTIC** conduit

Ease of use Unlike the wood moldings and rigid type of conduit normally used, KRALASTIC conduit can be flexed to follow irregularities of pole or mounted equipment, saving many needless breaks or fittings. It is simply and quickly cut to length with a hacksaw, securely stapled in place. And conduit of KRALASTIC is easy to handle because it's lighter than aluminum.

Protection KRALASTIC is an excellent electrical insulator. It is extremely tough, even in thin-wall sections, in this case allowing reduction in conduit diameter from the previously used 2" to 1". It not only requires less material, but is less bulky and easier for linemen to climb around. KRALASTIC's unusual toughness protects against accidental damage from linemen as well as storms and other causes. And, of course, KRALASTIC can't rust, rot, or corrode, withstands weather at its worst.

Economy Because extruded KRALASTIC conduit is relatively inexpensive, unusually easy to work with, and extremely durable, it provides important savings in all areas.

What's *your* line? If it involves piping or conduit, it might well call for KRALASTIC... the original ABS plastic that has proved its superiorities in nearly 10,000 miles of piping installations, in other products from baby combs to football helmets. Better look into KRALASTIC now.

United States Rubber
Naugatuck Chemical Division
934K ELM STREET
NAUGATUCK, CONNECTICUT

KRALASTIC RUBBER-RESINS • **MARVINOL** VINYLS • **VIBRIN** POLYESTERS

Akron · Boston · Chicago · Gastonia · Los Angeles · Memphis · New York · Phila. · CANADA: Naugatuck Chemicals · Elmira, Ont. · Cable: Rubexport, N.Y.

NEW! DIFFERENT!

The ONLY SWITCH of Its Kind

TOUCH-A-MATIC

AN E-Z WIRE® DEVICE

THE ONLY SWITCH WITH BOTH SCREW AND E-Z WIRE PRESSURE TERMINALS

3 COMMON TERMINALS FOR CONVENIENT FEED THRU CONNECTIONS

COMPACT USE IN ANY POSITION

FEATHER TOUCH
INSTANT ACTION
ROCK IT—PUSH IT—TOUCH IT

PRESS IT
TAP IT
FLIP IT
ROLL IT

QUIET SWITCH

15 and 20 AMPS, 120-277 VOLTS AC ONLY

AUTOMATIC POSITIVE ACTION

Patent No. 2,743,330

Works Mechanically . . . Not Manually

MEETS FED. SPECS.

TURNS ON THE LIGHT... NOT THE NOISE!

IN SINGLE POLE AND 3 WAY.

ALSO AVAILABLE IN INTERCHANGE TYPE

THE SWITCH WITH ALL THE ADVANTAGES AT NO EXTRA COST

STOCK AND SPECIFY

TOUCH-A-MATIC

CASH IN ON THE DEMAND

FOR FREE SAMPLE WRITE US ON YOUR LETTERHEAD

See the TOUCH-A-MATIC at EAGLE booth No. 196 • Oct. 24-26 NECA Exposition — Las Vegas, Nevada

EAGLE ELECTRIC MFG. CO., INC.
LONG ISLAND CITY 1, NEW YORK
"PERFECTION IS NOT AN ACCIDENT"

NEW DRAW-OUT DESIGN
LIMITAMP* MOTOR CONTROL

DRAW-OUT CONTACTOR

. . . cuts Limitamp control installation time

Rated 2300- to 4600-volts for a-c motors up to 3000 hp.

A draw-out contactor which automatically connects or disconnects as it is rolled in or out of the enclosure!

This is just one of the revolutionary design features in General Electric's new Limitamp motor control . . . a new design which cuts installation time in half!

During installation the contactor is easily withdrawn, leaving ample room to enter the enclosure, pull both motor and incoming power cables and make connections. When cables are connected, barriers are placed in position to seal off incoming line cable and a-c bus. The motor cable—located in its own raceway—is completely accessible when the starter is de-energized.

As the contactor is rolled back in, stab-on contacts automatically plug into the de-energized power circuit. At the same time, control power is automatically engaged. Installation time is held to a minimum.

Ask your G-E Apparatus Sales Engineer about other advanced-design installation, operation, performance and maintenance features of new Limitamp control. Or, write Sect. 783-11, General Electric Co., Schenectady, N. Y. for Bulletin GEA-6893. Industry Control Dept., Salem, Va.

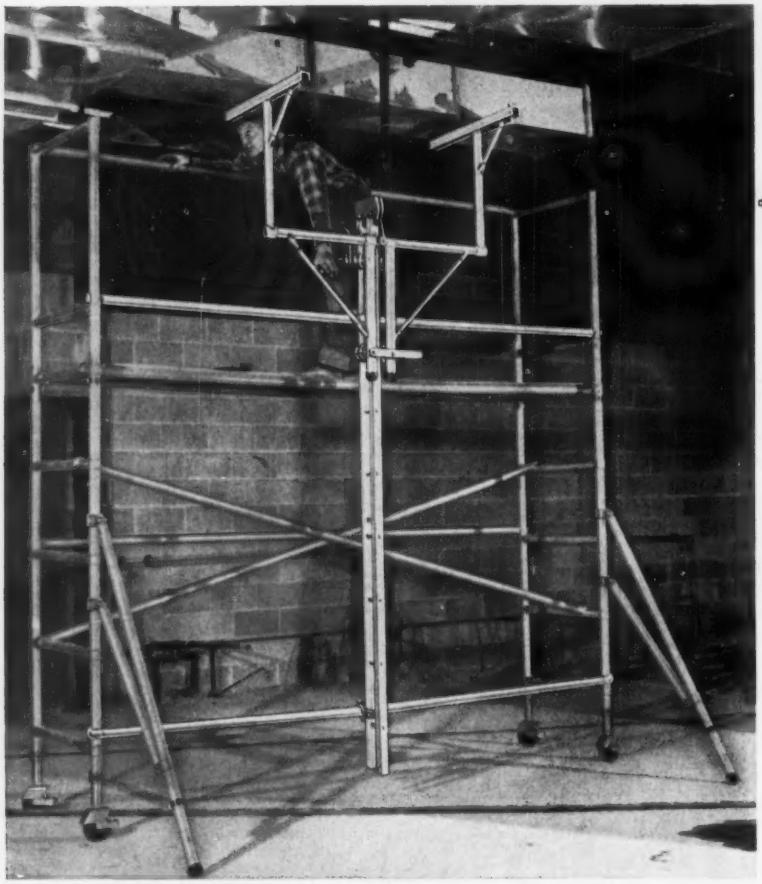
Progress Is Our Most Important Product

GENERAL ELECTRIC

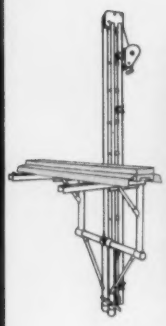
* Reg. Trade-mark of General Electric Company

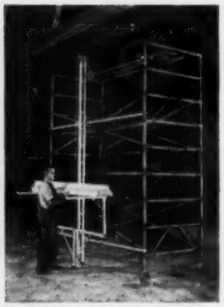
Double your workman's production...

UP-RIGHT mechanical man lifts & positions material for fast, one-man installation

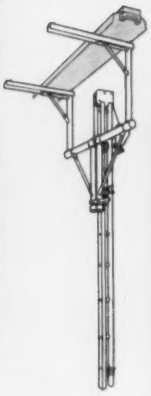


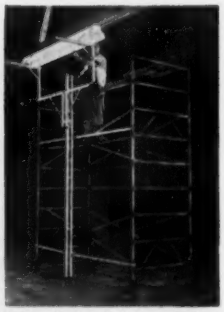
Workman and mechanical man accurately position 9 ft. long air duct for easy, rapid installation.



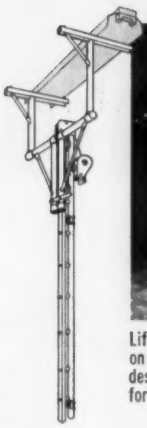


Fixture is placed on lifting arms at convenient chest height.





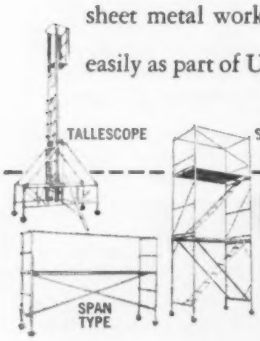
Fixture is elevated along vertical track by winch.



Lifting arms move horizontally on rollers and elevate fixture to desired position above workman for fast, convenient installation.

Mechanical man is an aluminum hoist assembly instantly attachable to any Up-Right or other scaffold. It saves fatigue and manhours in positioning fluorescent fixtures, bus-ducts, conduit, pipe and sheet metal work for overhead installation at any height. Rolled easily as part of Up-Right aluminum scaffold.

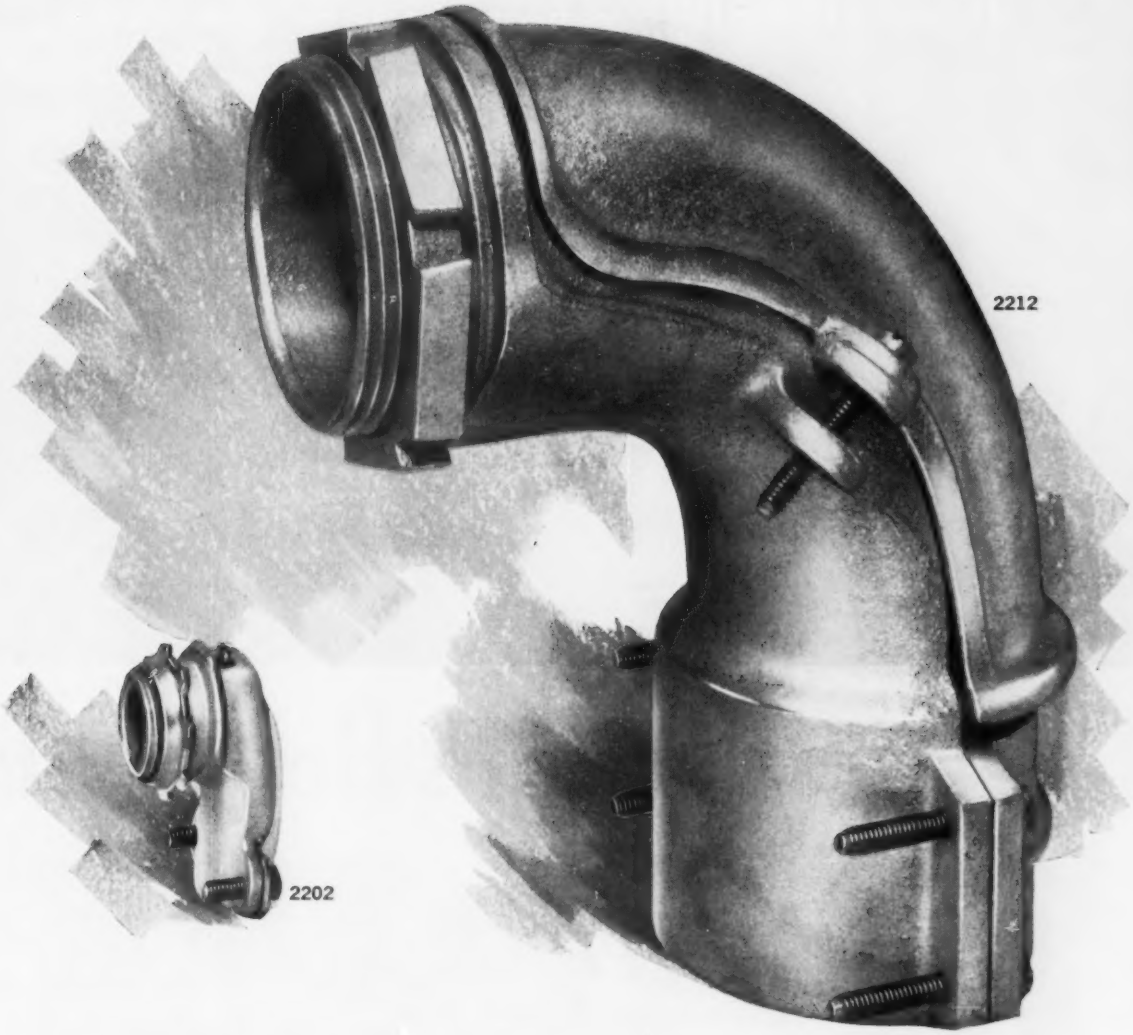
Write for descriptive circular



UP-RIGHT SCAFFOLDS

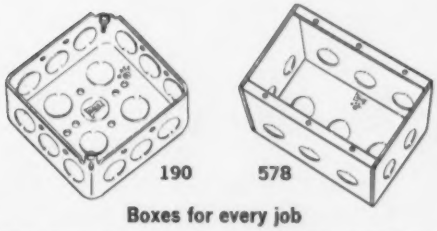
DEPT. 177 1013 PARDEE, BERKELEY, CALIFORNIA

In Canada: Up-Right Scaffolds Ltd., 120 Russet Ave., Oshawa, Ontario



Fittings for every need

from one reliable source...RACO



Boxes for every job

Raco boxes offer you more dollar-saving installation benefits than any other. It's the longest line, too.

No matter what you need fittings for, you can avoid problems by specifying Raco. You'll find threads are deep and true. Set screws are in place and turn easily. Finishes are bright and clean.

From the largest service entrance fitting to the smallest, you'll find the right fitting at Raco.

Most versatile and complete line of roughing-in materials.

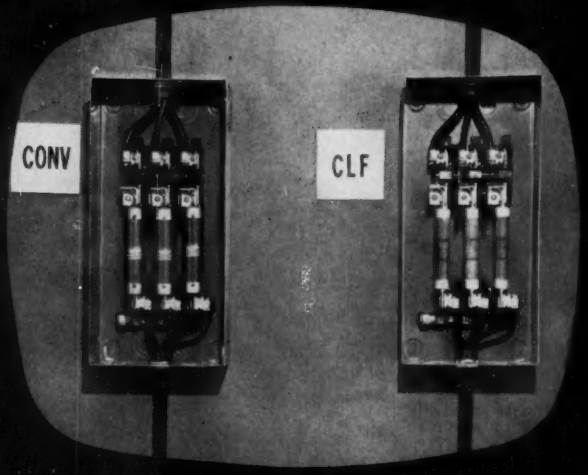
RACO

ALL-STEEL EQUIPMENT INC.

Aurora, Illinois

DON HERBERT reports on fuse test where . . .

Don Herbert, General Electric's TV Progress Reporter, brings you the latest news on fuse progress.

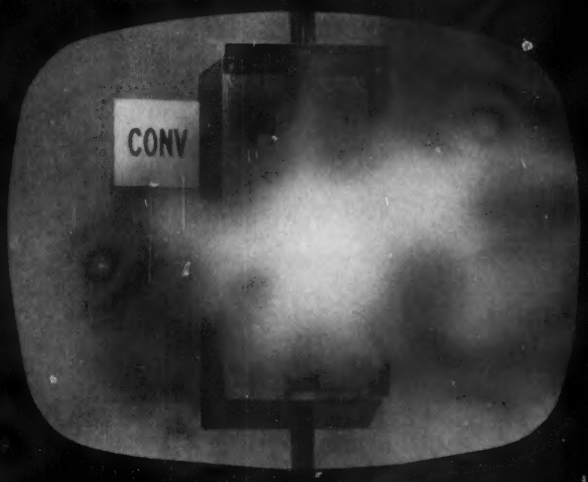


In a side by side comparison, conventional fuses and G-E CLF fuses are being tested at 40,000 amps short circuit.

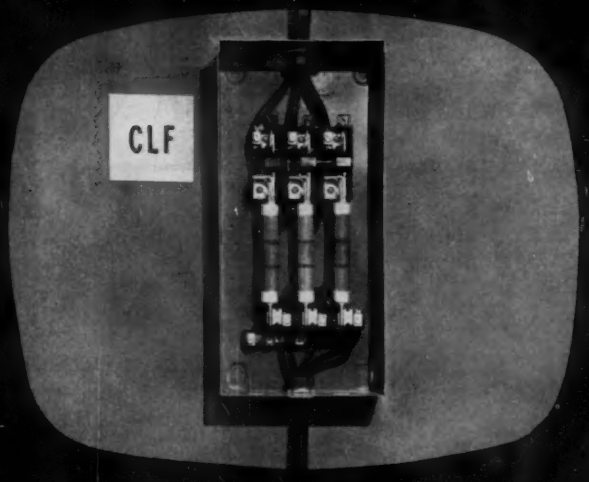
You get top safety with

STOCKS OF CLF FUSES to meet your every need are available at your authorized General Electric distributor. The G-E CLF fuse is designed to meet the requirements of the NEMA and N.E.C. Standards, and Underwriters' Laboratories, Inc.

conventional fuses failed—G-E CLF FUSES DID NOT!



Close-up of Conventional Fuses shows that the 40,000 amp current surge has touched off a powerful explosion.



CLF fuses have safely opened the circuit, with no external disturbance.

General Electric CLF* fuses

You install fuses for protection—but do you know how much protection your presently-installed fuses are actually providing?

The tremendous expansion of power systems has greatly increased the short circuit levels in most industrial and commercial areas. Yours may be one area where this increase has exceeded the safe interrupting capacity of conventional cartridge fuses. That's where General Electric's CLF Fuses, with high interrupting capacity of 200,000 amps, give you *sure* fuse protection.

The CLF fuse is available in ratings 6 through 4000 amps, up to 600 volts. It can truly be called the "fuse of the future" because:

- 200,000 ampere interrupting rating virtually eliminates the possibility of its being applied beyond its ratings
- pure silver elements and high-strength casing are not susceptible to aging
- pure silver elements will not weaken on current surges which do not melt the fuse
- current limiting action reduces or eliminates system damage caused by short circuit stresses during interruption time
- silver plated terminals won't deteriorate with age—maintain efficient, low-resistance contact surface.

534-06

Your General Electric Distributor is equipped to answer your questions on CLF protection and in most cases can serve you from stock. Standardize on G-E CLF fuses and forget your short circuit worries.

*Trademark of General Electric Company for high interrupting capacity fuse which meets New NEMA Standard FU 1-1959.

Progress Is Our Most Important Product

GENERAL ELECTRIC

"Equal to RLM" ...Anyone can Say it!

BUT

Only the RLM LABEL can GUARANTEE IT with a continuous RLM Test Program of Inspections by the ELECTRICAL TESTING LABORATORIES

"Equal to RLM" is a claim that is often made by sellers of industrial lighting equipment. No finer compliment could be made to the high quality RLM specifications!

However, RLM is more than a group of widely approved standards for industrial lighting equipment. RLM is also a guarantee of conformance. This guarantee is backed by the unbiased tests conducted by an independent testing laboratory—The ELECTRICAL TESTING LABORATORIES OF NEW YORK! These tests assure not only compliance with standards but every effort is made to insure that *every fixture* shipped to the buyer will be of uniform quality.

In the entire lighting industry there is no equal to this testing program... so in the truest sense there can be no such thing as "equal to RLM." RLM is unique... distinctive and above price to the buyer who wishes unbiased proof of quality.

THE FINAL INGREDIENT

Into each factory go ETL representatives to secure for test and certification purposes, samples of the manufacturer's RLM-labeled units.

OF BEING SURE

PRODUCT QUALITY
LIGHTING QUALITY

These TWIN QQ's to Industrial Lighting Success
are guaranteed with all lighting equipment bearing the RLM Label.
Return of the coupon brings you full information.

RLM STANDARDS INSTITUTE, Suite 3199 326 W. Madison, Chicago 6, Ill.

Please send me free a copy of the new "TWIN QQ's" pamphlet, the latest RLM SPECIFICATIONS BOOK, and names of the leading manufacturers offering RLM-labeled lighting equipment. (Please write name, company and address in margin below.)

R-763

GEDNEY'S RIGHT THERE IN YOUR CORNER

helping save time . . . hold down costs

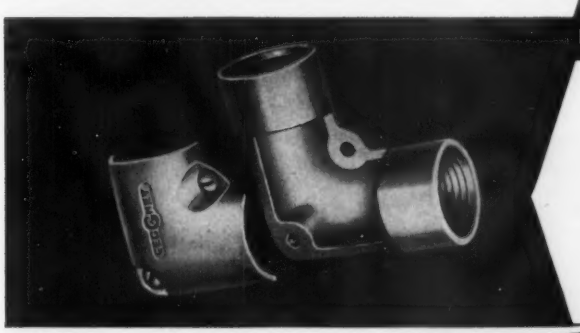
CORNER FITTINGS? Well, here are three that have proved immensely popular for the simple reason they're easiest to install – save time and labor that really counts up. Like the rest of the full Gedney line they're made of unbreakable malleable iron...accurately machined and threaded . . . individually inspected. Order Gedney – always – for lowest installed costs!

90° CORNER ELLS

Fitted with gasketed cover. Both ends female. Made of malleable iron, cadmium plated. Available in a full range of sizes from ½" to 2".

90° CORNER ADAPTERS

Fitted with gasketed cover. One end male, one end female. Made of malleable iron, cadmium plated. Your choice of sizes from ½" to 2".



CORNER PULL-IN CONDUIT ELLS

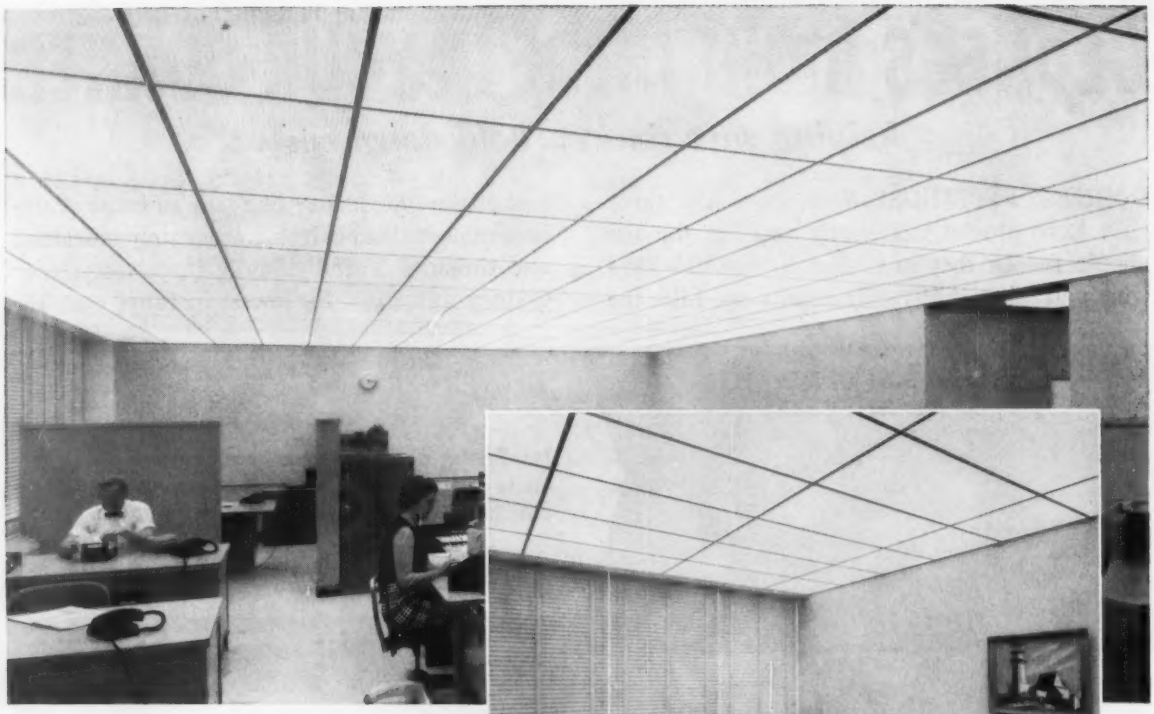
Today's top specification for space-saving, machine wiring, easy wire pulling. Malleable iron, cadmium plated. Sizes run from ½" to 2".

GEDNEY FITTINGS FIT

GEDNEY
ELECTRIC COMPANY

GEDNEY

RKO BLDG. • RADIO CITY • NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.



200 Footcandles of Environmental Lighting with

SYLVANIA'S SYLVA-CELL SYSTEM

Sylvania's Sylva-Cell Lighting System often provides an installation with more than just superb lighting. Because of the versatility and attractiveness of this extended area lighting system, its use as a design element can contribute completeness and uniformity to the overall environment.

At West Penn Power Company's new Jefferson District Headquarters, Sylva-Cell gives soft, comfortable illumination to general areas, private offices and other individual rooms—with lighting levels of 200 foot candles or more.

At the same time it adds to the general effect by tying together and complementing the other design elements.

The flexible Sylva-Cell System—based on a 2′ x 4′ module—offers shieldings of plastic or aluminum louvers or Circlgrid, a new shielding with a refreshing, luminous circular pattern.

With its simplicity of installation and low-maintenance characteristics, Sylva-Cell can answer a wide variety of commercial and industrial lighting problems.

Look into the advantages of Sylva-Cell when your requirements call for high quality lighting plus a versatile design element to help create a comfortable, attractive atmosphere.

Complete details will gladly be sent on request.

SYLVANIA LIGHTING PRODUCTS
A Division of SYLVANIA ELECTRIC PRODUCTS INC.
One 48th Street, Wheeling, W. Va.

SYLVANIA

Subsidiary of **GENERAL TELEPHONE & ELECTRONICS**

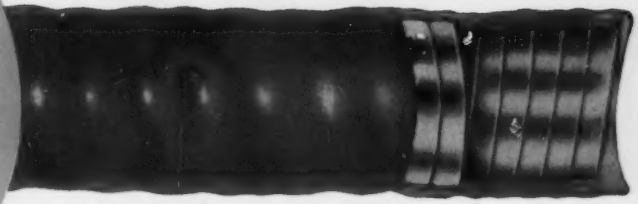
GENERAL SYSTEM

COLUMBIA

FLEX-SEAL

FLEXIBLE

liquid-tight electrical conduit



COSTS LESS*

REDUCE MAINTENANCE

•

PERMANENT PROTECTION

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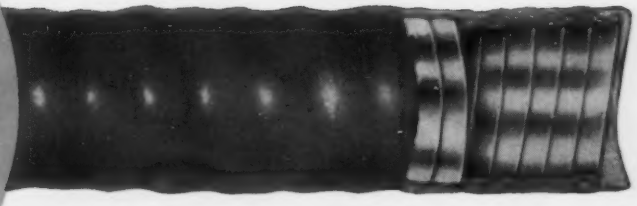
OIL • GREASE • CHEMICALS

SALT SPRAY • DIRT

WATER



* It's a fact: your cost is lowest when your first cost is your last cost. You not only make a better installation—faster—it guarantees you a lifetime of dependable service . . . and then some.

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Wallet-size guide, filled with helpful facts for daily on-the-job use. Write for your copy.

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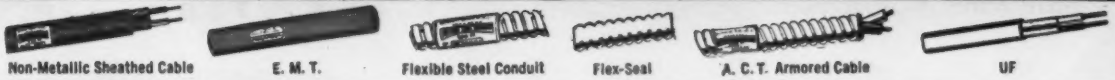
Columbia Flex-Seal, type XL with bonding strip, is UL approved. Type EX, without bonding strip, is J.I.C. approved. Sizes from ⅜" to 2" ID. Write for informative brochure.

COLUMBIA CABLE & ELECTRIC CORP.

Serving the Electrical Wholesaler Since 1912

255 CHESTNUT STREET BROOKLYN 8, N. Y.



Non-Metallic Sheathed Cable | E. M. T. | Flexible Steel Conduit | Flex-Seal | A. C. T. Armored Cable | UF

IF YOU'RE THE ONE CONTRACTOR IN TEN WHO'S SATISFIED WITH HIS PROFIT PICTURE... THEN READ NO FURTHER

We want to reach the go-getters... contractors who are alert to a good chance to pick up some more dollars. Here are some Edwards products that are naturals for the contractor that really wants to get out and do some creative selling. And we mean it when we say they're profitable. You have no fight with the manufacturer—you get these products through your electrical distributor and **you** do the installation...with the local Edwards man to help out in the more technical layout and specifications when you need him. You profit with the product **and** the installation. Learn how you can work these into your profit-making sales program.

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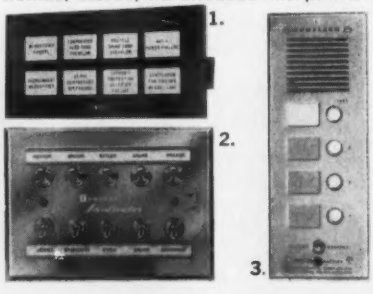

The prospects are there...the products are naturals...all it takes is a contractor with drive enough to sell. For complete information on these and other contractor profitables, call your local Edwards man today or write direct. While you're at it you might want to investigate the advantages for you in Edwards new Contractor Better Selling Program. Edwards Company, Incorporated, 90 Connecticut Avenue, Norwalk, Conn.

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(In Canada: Edwards of Canada, Ltd., Owen Sound, Ontario)

SURFACELINE

LIGHTING BY miller

New . . . Shallow Fluorescent Fixtures with HINGED DOORS

Store, Office, Public Building . . . New Building Project or Remodeling. Whatever the job . . . consider these Surfaceline *benefits!*

Appearance: Surfaceline's shallow depth and clean, modern lines assure you of pleasant, unobtrusive lighting.

Design Latitude: These fixtures can be economically installed singly, in modular patterns, or in continuous rows. Five sizes, five different plastic or glass closure bottoms.

Safe, Easy Maintenance: Miller's famous, "light-tight" hinged doors are secure, easily operated. Maintenance requires no tools . . . no handling of loose parts.

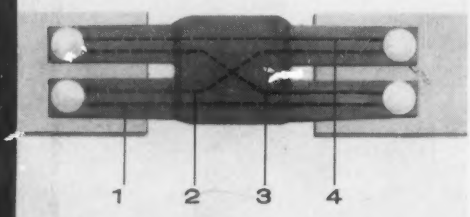
Whatever the job . . . discover how Surfaceline can meet your particular lighting needs! Write Dept. 360 at Meriden, Conn., for catalog information.

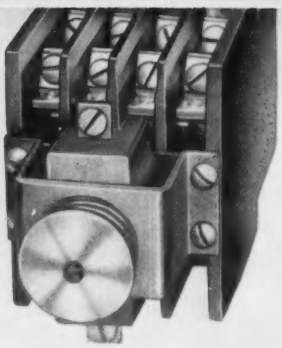
THE miller COMPANY
MERIDEN, CONNECTICUT • UTICA, OHIO

LIGHTING BY
miller
SINCE 1844

Another Cutler-Hammer first! Up to 24 poles in an area less than the size of a dollar bill.

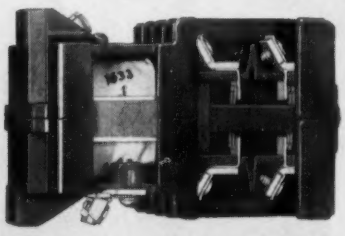
New contact reliability. Parallel bifurcated contacts, which allow four current paths instead of one, provide infinitely greater circuit reliability . . . liberally designed so any current path carries full relay rating.





At last! "Mechanical memory" latch as reliable as the relay itself! No adjustment ever needed. Add latch at any time.

New simplified design! Cutaway view shows basic simplicity. Coil vacuum impregnated to resist damage from humidity, vibration, electrical stress. Terminals can be screw or spade type.



Space savingest relay you've ever seen: New Cutler-Hammer "Compact 300"

Versatile 300 V. control relay is so reliable it's permanently sealed!

Here is the best answer yet to the need for an extremely reliable, small-size 300 V, 6 amp., industrial relay — the new "Compact 300" from Cutler-Hammer.

Every detail known that affects relay reliability has been improved in the "Compact 300." Bifurcated contacts which make possible *four* current paths rather than one, add millions of operations to the "Compact 300's" electrical reliability.

In fact, we're so confident of its electromechanical reliability, we permanently enclose the "Compact 300." And, if it should be damaged by a fault current, you throw it away and replace it with a new one. Its low price makes this an economical, practical maintenance procedure.

Now think of the space you can save with the "Compact 300." It controls up to eight circuits in panel space only 2″ wide by 2¾″ high. 2, 3, 4, 6 and 8 poles with any combination of N.O. or N.C. contacts are available, of course.

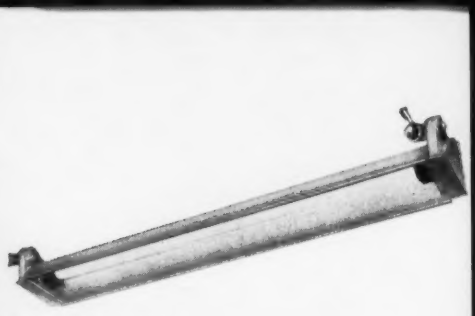
At any time, you can add "mechanical memory" latch with a life equal to the life of the relay. No adjustments are ever necessary. Contact your Cutler-Hammer distributor for details on the "Compact 300" or send for Pub. ED-L079-S241.

What's new at Cutler-Hammer? New, better products, like the 300 V. relay are coming steadily from our new, expanded plant facilities. We're ready now to help you take care of the great industrial growth of the future. If you are planning ahead and need electrical control assistance, contact the nearest Cutler-Hammer sales office.

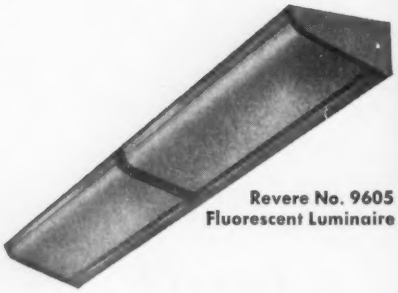
WHAT'S NEW? ASK...

CUTLER-HAMMER

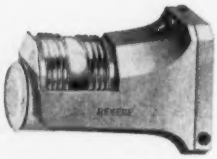
Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.



Revere Series 8650
"Fluoresign" Fluorescent Luminaire



Revere No. 9605
Fluorescent Luminaire



Revere No. 3151-A
Incandescent Underneath Floodlight

Widest line of fixtures lets you light store or building fronts the one best way for each job

There's one *best* way to solve each application problem in lighting store fronts or building fronts. Whichever way you decide is best for the job at hand, you'll find your Revere wholesaler has exactly the fixtures you need.

Revere makes the widest line of outdoor lighting equipment — engineered for easy installation, structurally matched for strength and balance, and design-matched for peak lighting efficiency and best appearance.

You can solve more outdoor lighting problems of any type — selecting the equipment to do the job best — knowing you can get it from Revere. Revere offers a complete line of hinged or rigid poles . . . mercury, incandescent or fluorescent luminaires . . . floodlights, fixtures and fittings. All equipment from your Revere wholesaler simplifies ordering and assures delivery of all components to your job site according to your schedule.

Ask your wholesaler about Revere outdoor lighting equipment for your next installation, no matter what equipment is called for to do the job best. Write to us for a catalog showing Revere's complete line.

Revere
ELECTRIC MFG. CO.

OUTDOOR LIGHTING

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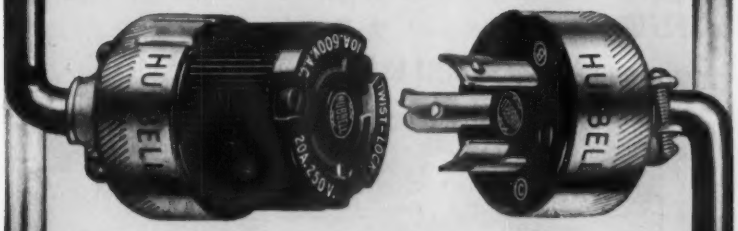
ONLY

HUBBELL

MAKES *SUPER*

Twist-Lock®

WIRING DEVICES



CAT. NO. **3323**
SUPER TWIST-LOCK
ARMORED BODY
20 AMPERES, 250 VOLTS, AC OR DC
10 AMPERES, 600 VOLTS, AC ONLY

CAT. NO. **3321**
SUPER TWIST-LOCK
ARMORED CAP
20 AMPERES, 250 VOLTS, AC OR DC
10 AMPERES, 600 VOLTS, AC ONLY

Super Twist-Lock devices are smaller, more compact and lighter in weight than regular Twist-Lock units. On the surface they look very much like their conventional brothers but actually they incorporate important construction features that place them in a class by themselves. Both the cap and connector body feature screwless pressure grip terminals which simplify and speed wiring and a revolutionary 2-piece dead front construction that seals out dust, dirt, lint, metal chips, etc. Terminals are pressure locked between the two independent sections so that all wiring is completely enclosed . . . the ultimate in wiring safety and security.

All units in the Super Twist-Lock line can be interchanged with regular Twist-Lock connectors of equal rating. This is most advantageous in industrial plants where regular Twist-Lock devices are now installed on machine tools or other equipment.

For complete information on Hubbell Twist-Lock devices, see Hubbell Catalog #29 or check Sweet's File 3lb/Hu.

IT PAYS TO HAVE HUBBELL GOOD CONNECTIONS

HARVEY
HUBBELL
INCORPORATED
BRIDGEPORT 2, CONNECTICUT
In Canada: Scarborough, Ontario

engineering news

HARVEY HUBBELL, INCORPORATED
Engineering Department

Super Twist-Lock incorporates many advantages that contribute to substantial savings in installation time and effort. Tests also prove that it is the safest, most rugged unit of its type ever produced.

Improved Cord Grips PROVIDE PULL-PROOF, PRESSURE-GRIP ON CABLE.

Convenient Knurled Strip Gage SPEEDS WIRING.

Cap Shell Keyed DIFFERENTLY FROM CONNECTOR BODY SHELL TO POSITIVELY PREVENT INTERCHANGE.

2-Piece Cap ENGINEERED TO MAINTAIN POLARITY.

Broad Pressure Plate Contacts

Completely Dead Front WITH NO EXPOSED WIRE ENDS TO COVER WITH FIBRE DISC. (DUST PROOF—DIRT PROOF, ETC.)

Greater Blade Rigidity . . . ALWAYS IN ALIGNMENT, THUS MAINTAINING BETTER ELECTRICAL CONTACT.

Positive Polarity

Captive Holding Screws . . . CAN'T FALL OUT . . . LOCKWASHERS PREVENT LOOSENING.

Heavy-Duty Bakelite RESISTS VIBRATION AND ROUGH USAGE.

Key Slots IN BAKELITE ASSURES PERFECT ALIGNMENT OF SPRINGS WITH SLOTS IN FACE. BLADES IN CAP FIT PERFECTLY AT ALL TIMES.

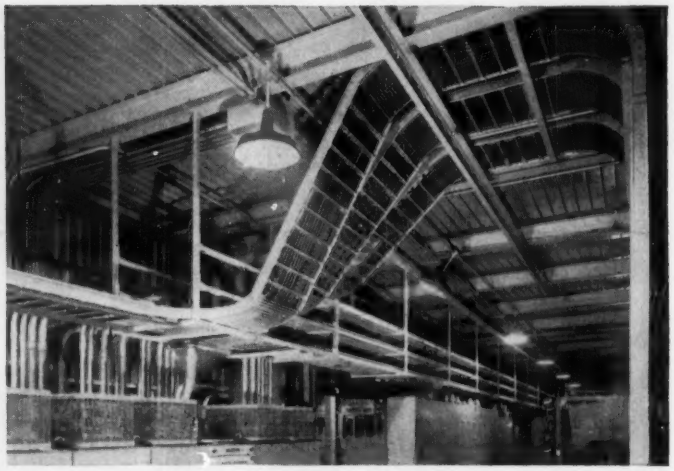
Screwless Pressure Terminals SIMPLIFY WIRING AND PERMIT GREATER WIRING UNIFORMITY.

Connector Body Shell KEYED TO PREVENT INTERCHANGE WITH CAP.

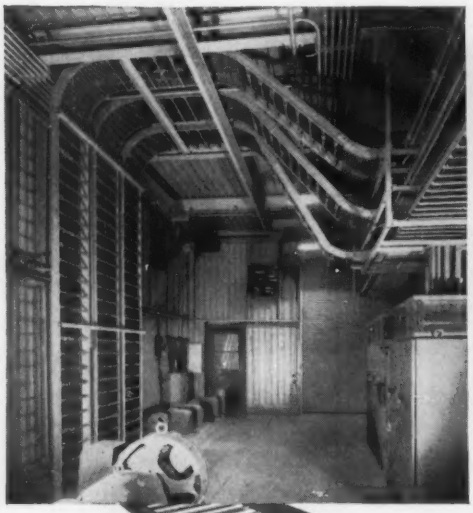
Rugged Steel Shell . . . PROTECTS INNER CONSTRUCTION.

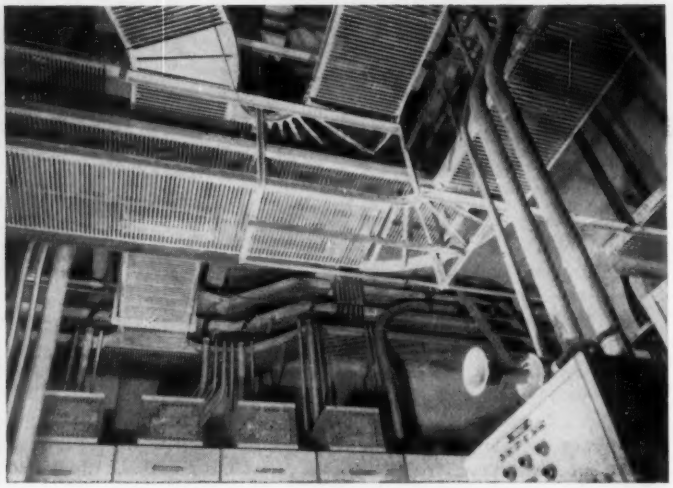
Twist-Lock is a registered trademark of Harvey Hubbell, Incorporated.

how INLAND STEEL uses GLOBE INTERCHANGEABLE TRAYS to support cables in their Indiana Harbor Plant

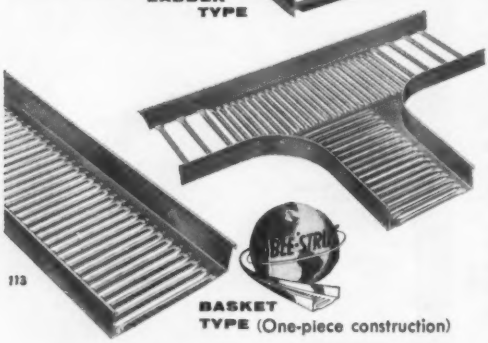


★ Engineered for Uniform Design and Easy Installation
★ Steel or Aluminum Construction
★ Complete Accessories for SPEEDIER Installation
★ Complete Interchangeability
★ No Sharp Edges to Damage Cables





LADDER TYPE



BASKET TYPE (One-piece construction)

Globe's two types of cable trays, one a ladder type and the other a basket type, to support cables, wiring and tubing have become increasingly popular because they can be used INTERCHANGEABLY at any given location depending on the type and weight of the cables to be suspended. The advantages of each type tray can be used to the fullest. Globetray, the ladder type, is intended for use where festooning is not a problem, while Cable-Strut, the basket type, is used for the support of communication wire, instrument tubing and control cables in automation applications.

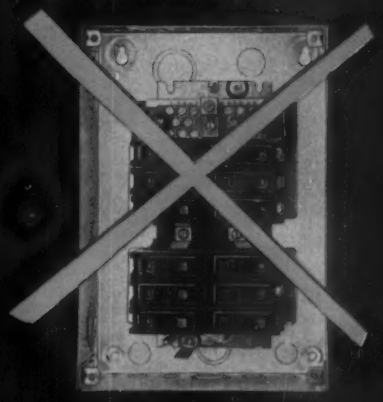
These two cable trays have been thoroughly field tested in hundreds of large industrial installations, in new plant construction, in power plants and for power distribution in all types of manufacturing processes. Send for FREE catalog giving full information and installation techniques.

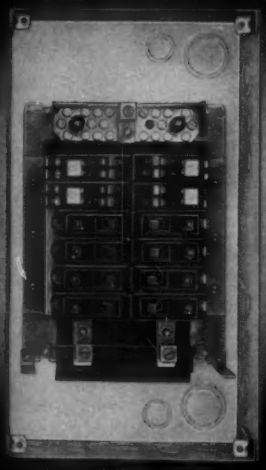
PRODUCTS DIVISION
THE GLOBE COMPANY Manufacturers since 1914
4032 S. Princeton Ave., Chicago 9, Ill.

Representatives in all principal cities . . . consult the yellow pages in your phone book under "Conduits" for the one nearest you.

NEW! FRANK ADAM LOAD CENTERS

More Features-More Versatile!





NEW QUICKLAG MAGNETIC COIL BREAKER GIVES TWICE NORMAL SAFETY

- New coil magnet plus thermal action on 15-amp. and 20-amp. breakers has faster trip—quick enough to protect against lamp cord overload. (Coil not required on higher-rated breakers).
- Elimination of screws on calibration prevents tampering.
- New "floating armature" relieves all pressure on bi-metal element.
- Class NI Non-interchangeable per NEC.

CAPACITIES: 15, 20, 30, 40, 50 and 70 amps.

KEEP PACE WITH ELECTRICAL LIVING

See our Catalog in SWEETS

- ✓ **NOW**—*all* Frank Adam Load Centers have sequence bussing with main lugs at bottom which makes possible *any* combination of 2-pole circuits.
- ✓ **NOW**—all lugs are dual rated to allow the use of copper or aluminum wire in centers 100-amps. and higher.
- ✓ **NOW**—the number of branches can be greatly increased simply by the use of Frank Adam **Duplex** breakers. **Duplex** and single breakers are entirely interchangeable.
- ✓ **NOW**—both QP and **Duplex** breakers are Class NI Non-interchangeable per NEC.
- ✓ **NOW**—all these improvements are in addition to the many other features that have already made Frank Adam Load Centers tops among quality equipment. *Write for catalog.*

FRANK ADAM ELECTRIC COMPANY

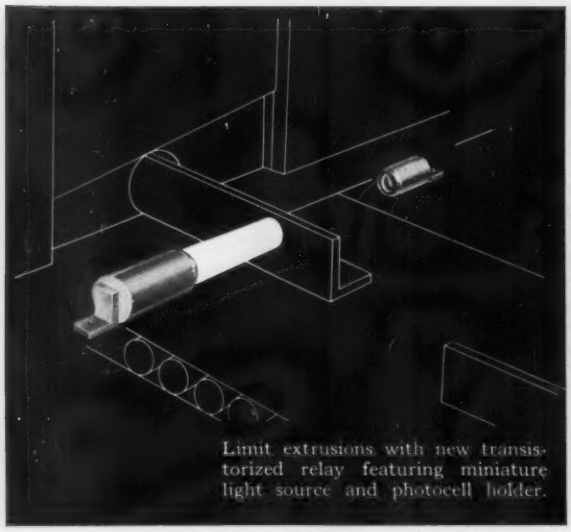
SINCE 1891

P. O. BOX 357, MAIN P. O. · ST. LOUIS 66, MO.

busduct • panelboards • switchboards • service equipment • safety switches • load centers • Quikheter

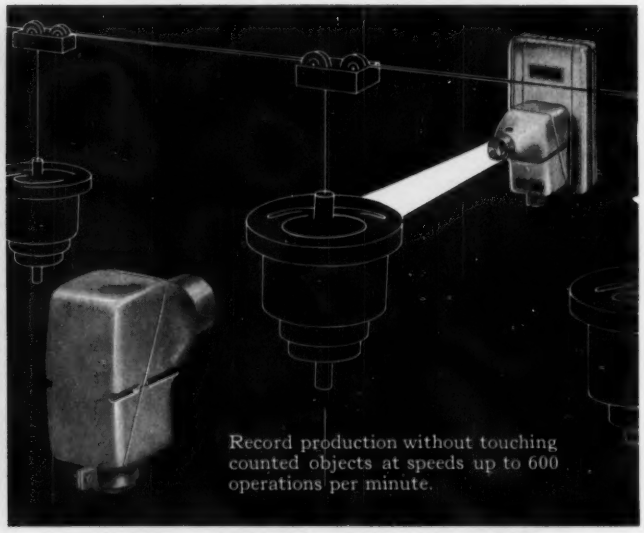
FOR QUALITY . . . PRODUCTIVITY . . . PROFIT . . . MODERNIZE WITH GENERAL ELECTRIC

LIMITING



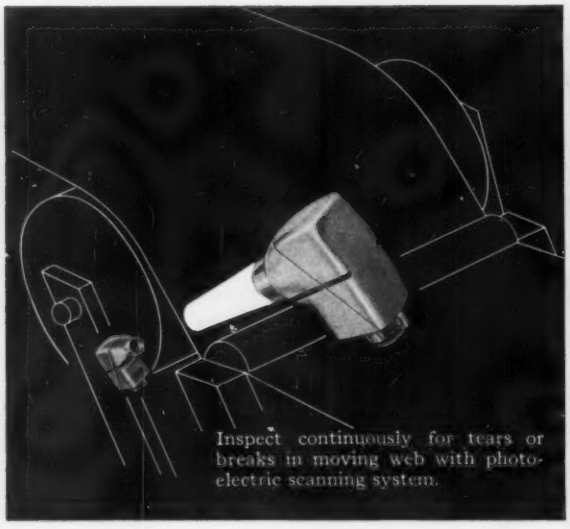
Limit extrusions with new transistorized relay featuring miniature light source and photocell holder.

COUNTING



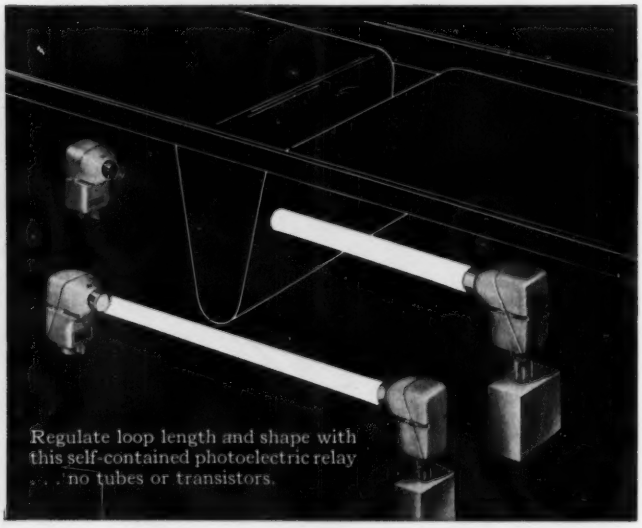
Record production without touching counted objects at speeds up to 600 operations per minute.

DETECTING



Inspect continuously for tears or breaks in moving web with photoelectric scanning system.

CONTROLLING



Regulate loop length and shape with this self-contained photoelectric relay . . . no tubes or transistors.

A COMPLETE LINE OF GENERAL ELECTRIC CONTROL DEVICES

Photoelectric controls
- General-purpose
- High-speed
- Long-distance

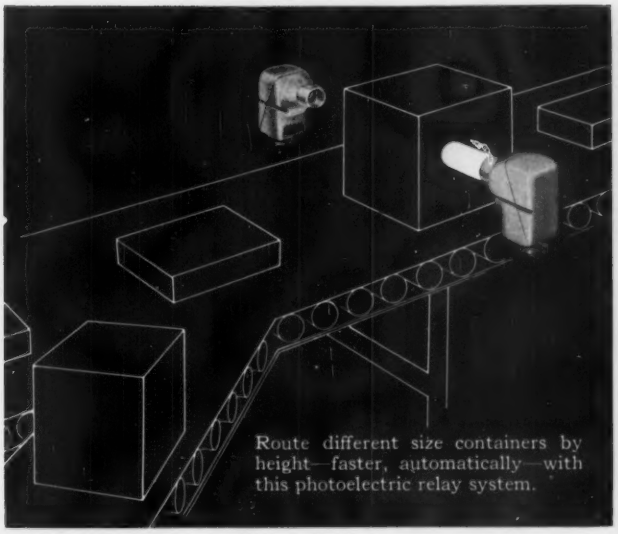
Electronic devices
- Timers
- Resistance-sensitive relays
- Voltage-sensitive relays

Photoelectric systems
- Smoke-density indicators
- Side-register controls
- Cut-off register controls

CONTROLS FOR AUTOMATION

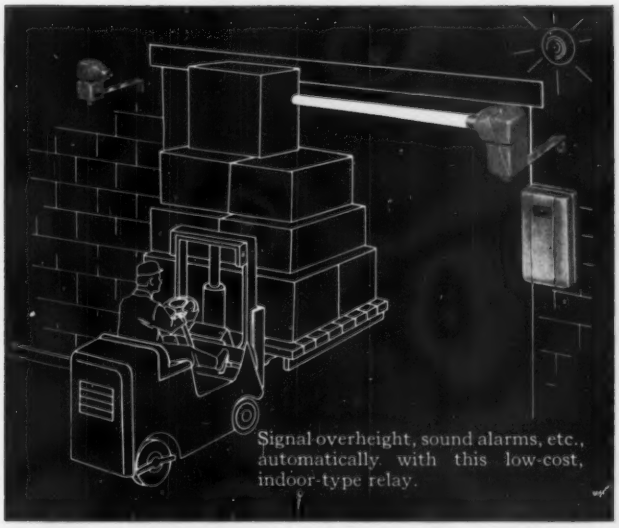
PHOTOELECTRIC CONTROLS

SORTING



Route different size containers by height—faster, automatically—with this photoelectric relay system.

SIGNALLING



Signal overheight, sound alarms, etc., automatically with this low-cost, indoor-type relay.

Switching . . . inspecting . . . counting . . . diverting . . . sorting . . . controlling. These are but a few of the *hundreds* of applications where General Electric photoelectric controls are helping our customers move closer to the benefits of automation—increased productivity, lower costs, higher quality.

Users are finding *new* ways to fit General Electric photoelectric devices into their production processes every day . . . for good reasons: These versatile G-E controls are designed for heavy-duty industrial use. They're easy to install, and require virtually no maintenance. They are highly dependable throughout a long operating life. In fact, General Electric photoelectric controls feature lamps with life expectancy of 10,000 hours—more than a year of round-the-clock operation!

ONE-YEAR WARRANTY, IMMEDIATE STOCK SHIPMENT

General Electric photoelectric and electronic devices carry a standard one-year warranty for your protection. And, your order for standard catalog devices is filled immediately from one of six regional warehouses. Also, replacement parts are warehouse-stocked, too, for your convenience and protection.

For expert help in applying General Electric photoelectric devices to your operations, call your nearby G-E Apparatus Sales Engineer or Distributor today. And, for your personal copy of our Photoelectric Devices catalog, mail the coupon below. *General Electric Co., Specialty Control Dept., Waynesboro, Va.*

SEND TODAY FOR FREE CATALOG

General Electric Co., Section G793-02
Schenectady 5, New York

Please send me a copy of the G-E Photoelectric Control catalog, GEA-6822, with description, specifications, and pricing data on the complete line.

Name _____

Company _____

Address _____

City _____ State _____

Progress Is Our Most Important Product

GENERAL ELECTRIC

Venetian Blind Manufacturing Co., Chicago, Ill. Architect: Harold A. Stahl, Chicago, Ill. Builder: Larson & Stoneberg, Park Ridge, Ill. Electrical Contractor: Circle Electric Company, Inc., Chicago, Ill.

John R. Lauria, Electrical Contractor, uses

Republic ELECTRUNITE® Electrical Metallic Tubing Because...

THE BEST COSTS LESS INSTALLED

REPUBLIC STEEL
STEEL AND TUBES DIVISION
Cleveland 8, Ohio

This STEELMARK of the American Steel Industry tells you a product is made of Steel. Look for it when you buy.

To learn more about ELECTRUNITE E.M.T.—Send Coupon

COlumbus 1-4999

CIRCLE ELECTRIC CO. INC.

Commercial -:- Residential -:- Industrial
Wiring Power and Light

5511 WEST DIVISION STREET
CHICAGO 51, ILLINOIS

December 28, 1959

Mr. Harry M. Henderson
District Sales Representative
Republic Steel Corporation
322 South Michigan Avenue
Chicago 4, Illinois

Dear Harry:

We just finished another installation where we used Republic ELECTRUNITE E.M.T. and the job went so smoothly, I thought I would drop a line and tell you how pleased we are with your product.

I have been using ELECTRUNITE for eleven years. During that time I have tried other brands, but none came up to the high quality of ELECTRUNITE.

Labor is a prime factor to any electrical contractor. I find ELECTRUNITE bends easier, goes in easier, and does not kink. The "Inch-Marks" and "Guide-Lines" are a big help. They eliminate guesswork and the need for a ruler. The exposed work of the finished job is neater.

Last but not least, the most important feature of ELECTRUNITE is the Silver-slick inside finish. We find this new finish combined with "Inside-Knurling" cuts wire pulling time at least one-third.

We just can't praise Republic ELECTRUNITE enough.

Very truly yours,

John R Lauria

CIRCLE ELECTRIC CO., INC.
John R. Lauria, President

JRL:cvw

COMPLETE LINE . . . REPUBLIC ELECTRICAL CONDUIT PRODUCTS

GALVITE® RIGID STEEL CONDUIT (Blue Label) is a heavy wall hot dipped galvanized conduit with a special coat of baked-on lacquer inside and out for greater corrosion-resistance and long life.

ENAMELITE® RIGID STEEL CONDUIT (Red Label) heavy wall conduit is protected inside and out with a baked-on coating of tough, wear-resistant enamel for greater protection against moderate corrosive action.

REPUBLIC "DEKORON®-COATED" E.M.T. is the plastic armored raceway recommended for use in severe corrosive conditions of service. Outlasts standard conduit 10-to-1. Easy to install, no special tools, no special fittings.

"DEKORON-COATED" RIGID STEEL CONDUIT is the heavy wall raceway that shrugs off corrosion. Tough coating of polyethylene encases Galvite Rigid Steel Conduit in an end-to-end armor for protection in severe corrosive conditions of service.

REPUBLIC BENDING TOOLS are designed and engineered to help the contractor make accurate predetermined bends in Republic raceway installations. Avoid costly "wows", wasted time, and wasted material. Send for The Bending System Booklet.

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION
DEPT. C-9381-B
212 EAST 131st STREET • CLEVELAND 8, OHIO

I want to learn more about the advantages of Republic ELECTRUNITE Electrical Metallic Tubing

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

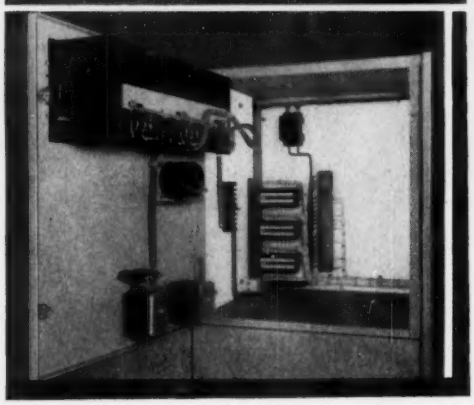
NEW COMPACTNESS

NEW SAFETY

NEW EASE OF ACCESS

NEW STORED ENERGY

This is the all-new I-T-E type HK metal-clad switchgear

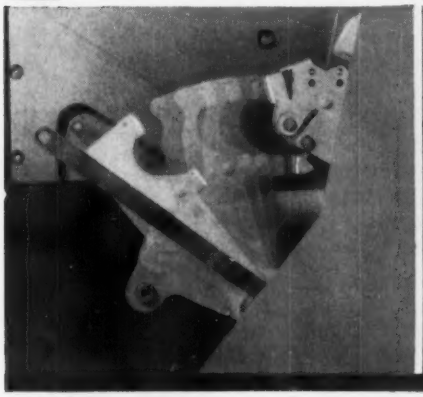


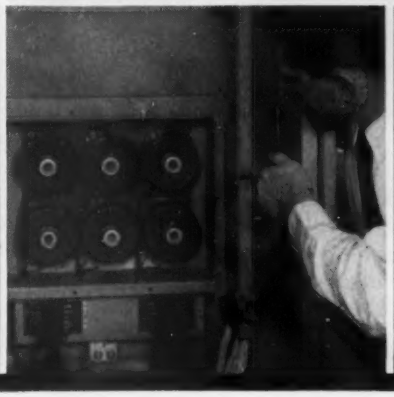
Roomy interior for easy access. Only I-T-E gives you a separate 30-in.-high instrument compartment, completely isolated from the high-voltage compartment. And it's closer to the floor, so you can reach into it easily. Put your elbows in and work in comfort. High visibility white interiors simplify installation and trouble shooting. Your control wiring can easily enter from the bottom or through the top sheet.

Free detailed bulletin—new strip film. Get the whole story about *all* the new advances in this I-T-E metal-clad switchgear. Learn about its easier operation, greater safety, and superior protection. Send for Bulletin 2801-2A. And ask also to see the new sound strip film. Can be shown to you singly or to your group. Contact your nearby I-T-E sales office or write I-T-E Circuit Breaker Company, Dept. SW, 1900 Hamilton St., Philadelphia 30, Pa.

Fits where others won't. This is a 4160 volt switchboard. See how low and shallow it is compared with old standards. It's only 80 in. high and 58 in. deep. So it saves both floor space and overhead space. Goes easily under low ceilings. Fits in narrower aisles. And its reduced height puts all instruments at easy-to-read eye level. Roomy cable compartments at the rear are accessible through hinged doors. All insulation in the switchboard and circuit breakers is flame-retardant and track-resistant.

Closed-door drawout. The door stays closed while the breaker is moved from connected . . . through test position . . . to disconnected and back. There's always solid steel at ground potential between the operator and the live parts of the gear. Even an inexperienced man is completely safe. Since doors stay closed, aisles need never be cluttered. And foreign matter can't get into breaker compartments.





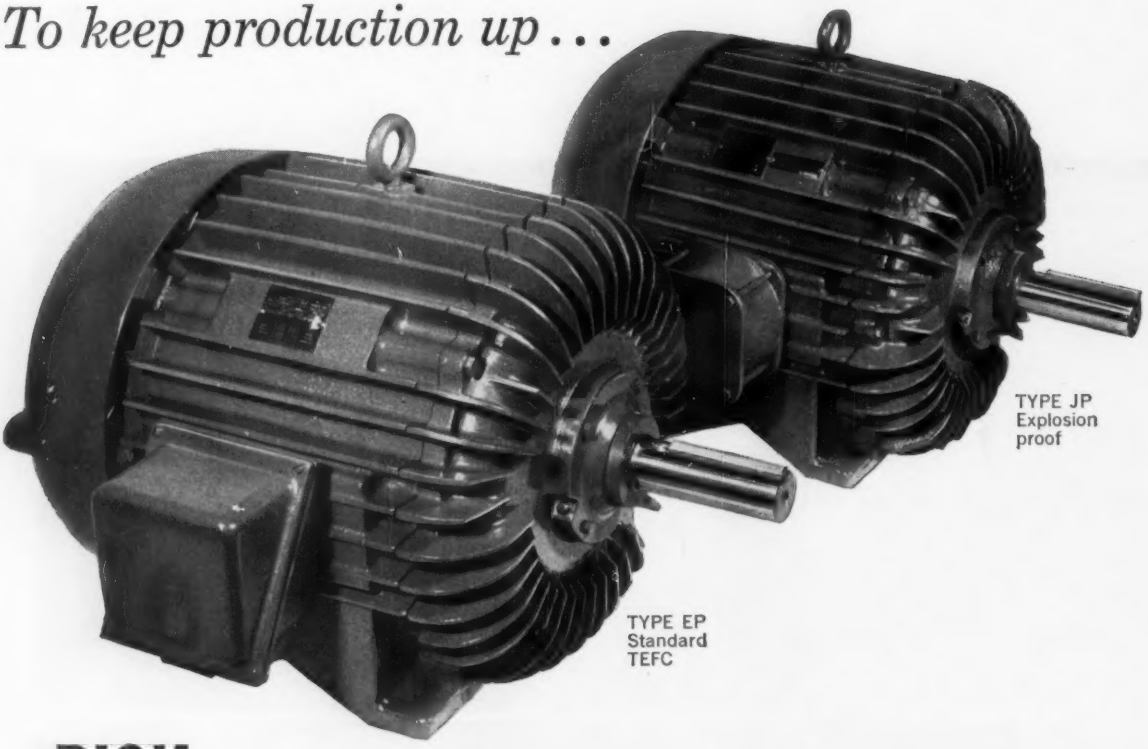
Stored energy closing. This is not simply a new feature added to an old design. It is integrated into a completely new circuit breaker design. Gives you fast, uniform closing every time. Prolongs contact life. And you can close the circuit breakers even without control power. For greater economy, the spring charging motor draws only one-tenth the current of previous methods.

Easy-to-change current transformers. They're accessible from the front. You don't need to disturb your cable connections at all. Just remove the shutter barrier assembly over the primary studs, and there they are. As this view shows, you can locate current transformers on both load and line sides of the circuit breaker, providing more flexibility in relaying.

Compact 4160 volt circuit breaker. Low center of gravity permits easy, safe, one-man maintenance. High-strength, flame-retardant track-resistant moldings eliminate need for structural metal above the base frame. Provides insulation strength where needed most. Arc chutes tilt for easy inspection. Lift off without tools. Modern materials and new design result in substantial reduction in circuit breaker size.

I-T-E CIRCUIT BREAKER COMPANY

To keep production up...



PICK FROM THIS PROTECTED PAIR...

Here's a power-packed pair of Wagner® totally-enclosed fan-cooled motors —Type EP, standard, protected against damage from dust, abrasive, fumes, steel chips or filings; and Type JP, explosion-proof, for safe use in specified hazardous locations.

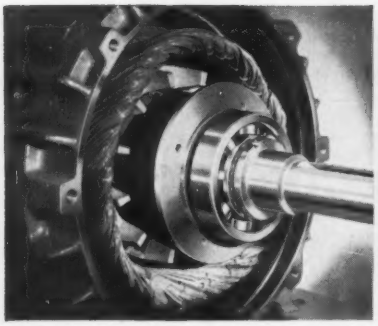
They'll keep your production rates up, delivering full rated horsepower under the toughest conditions . . . staying on the job with dependable, continuous service that means peak output. They're the perfect pick, for individual machines or for automated lines.

In the design illustrated, these motors are built in ratings through 100 hp in NEMA frame sizes 182-445U. Let your Wagner Sales Engineer show you how this protected pair (or larger Wagner enclosed motors through 500 hp) gets the job done. Call him, or write us for Bulletin MU-224.

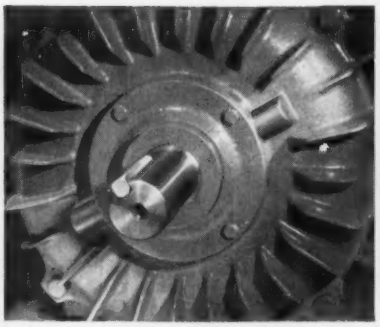
Wagner Electric Corporation

6413 PLYMOUTH AVENUE, ST. LOUIS 33, MISSOURI

WM60-19



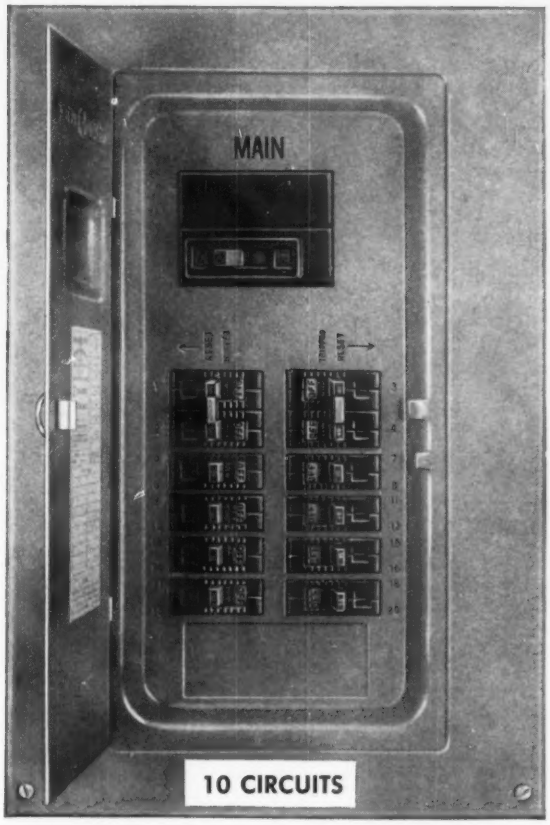
HEAVY-DUTY BALL BEARINGS . . . The ball bearings used in these motors are of the highest quality, with more than ample capacity to provide long, troublefree service under heavy loads.



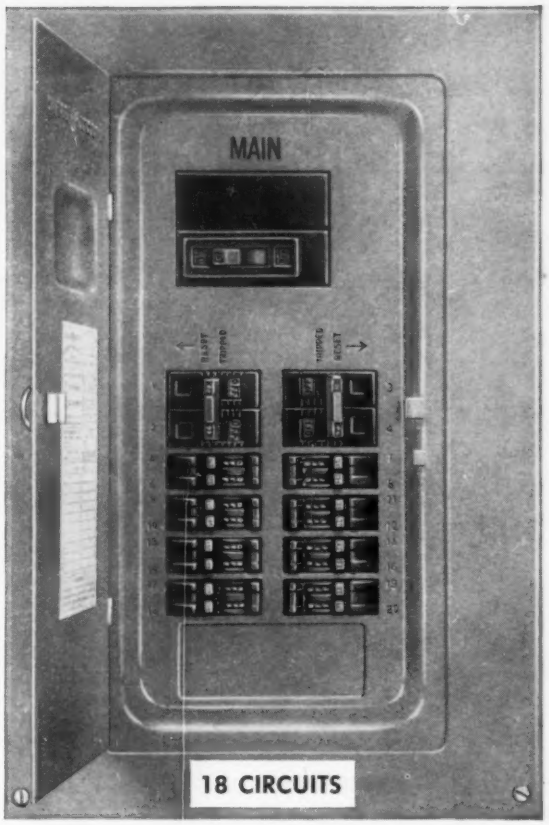
BEARINGS CAN BE RELUBRICATED . . . Factory lubrication will last for many years under normal service, but openings are provided to permit relubrication that adds years to motor life under severe conditions.

SECURELY SEALED FOR LOW MAINTENANCE . . . Both ends of these motors have running shaft seals to keep the bearings clean. Bearing housings are effectively sealed to prevent escape of grease.

Same box - 8 extra circuits



General Electric TRM1210S "twin"* load center wired with two double-pole TQL plug-in breakers and eight single-pole plug-in TQL's.



Same load center wired with two double-pole TQL's and *sixteen* General Electric Type TR "twins" — two rugged breakers in a one-inch case.

Install more circuits, buy a less expensive box, with

General Electric "twin" circuit breakers

NEW

70 and 100-amp plug-in breakers

Perfect for sub-feed panels or main disconnects (back-fed). Protected female stab receptacles grip tightly; can't bend; plug-in without jiggling. All current-carrying parts silver-plated for cool, safe operation.

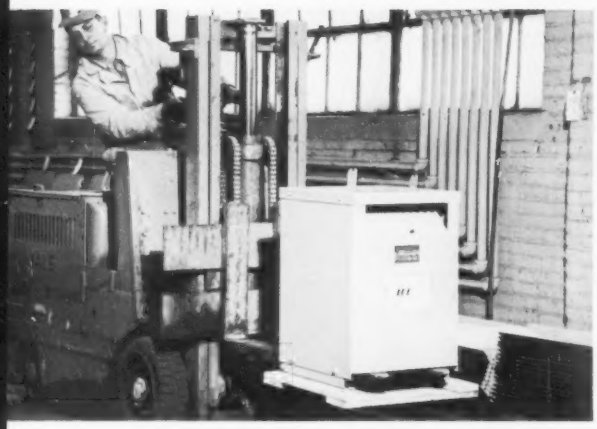
The "twin" lets you put up to twice as many circuits in the same space—because the "twin" is actually *two* rugged plug-in breakers in a single one-inch case.

Combined with other top-quality G-E breakers, the "twin" gives you complete flexibility in circuit arrangements. It is interchangeable with General Electric Type TQL single-pole and 2- and 3-pole common-trip breakers. Ask your G-E Distributor to show you how General Electric's "twin" can save you money on your next job.

*Trade-Mark

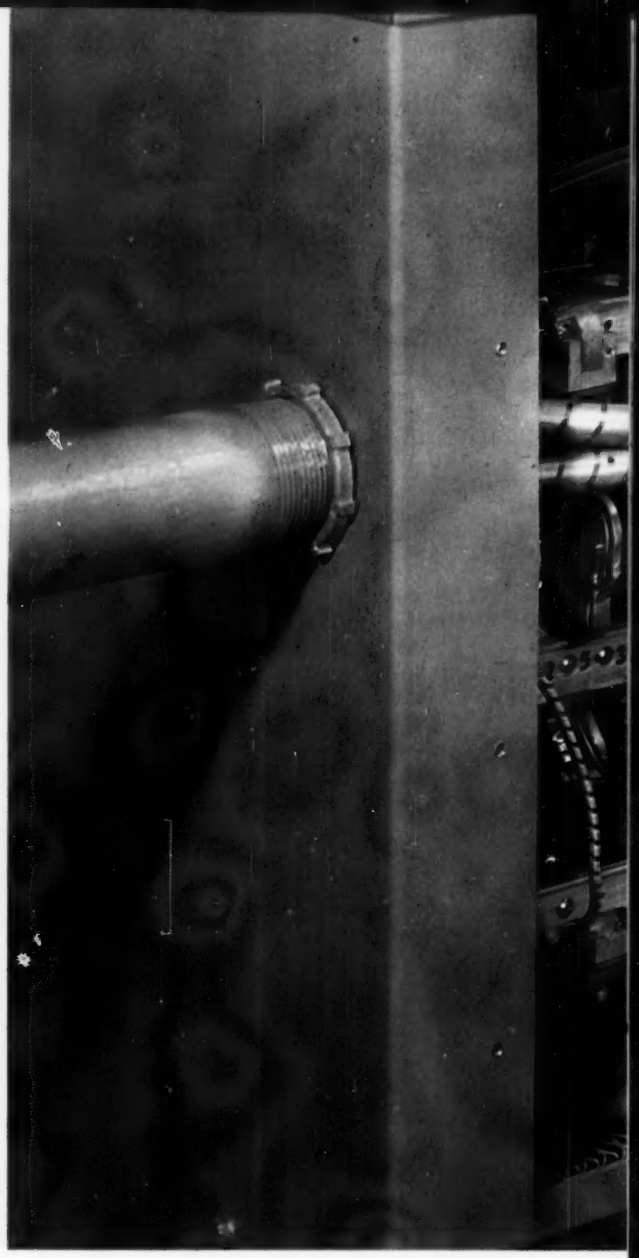
PROTECTING MEDALLION HOMES EQUIPPED BY GENERAL ELECTRIC

GENERAL ELECTRIC



Transformers are shipped on pallets which makes it easy for you to use a fork truck to position General Electric QHT dry-type transformers for mounting.

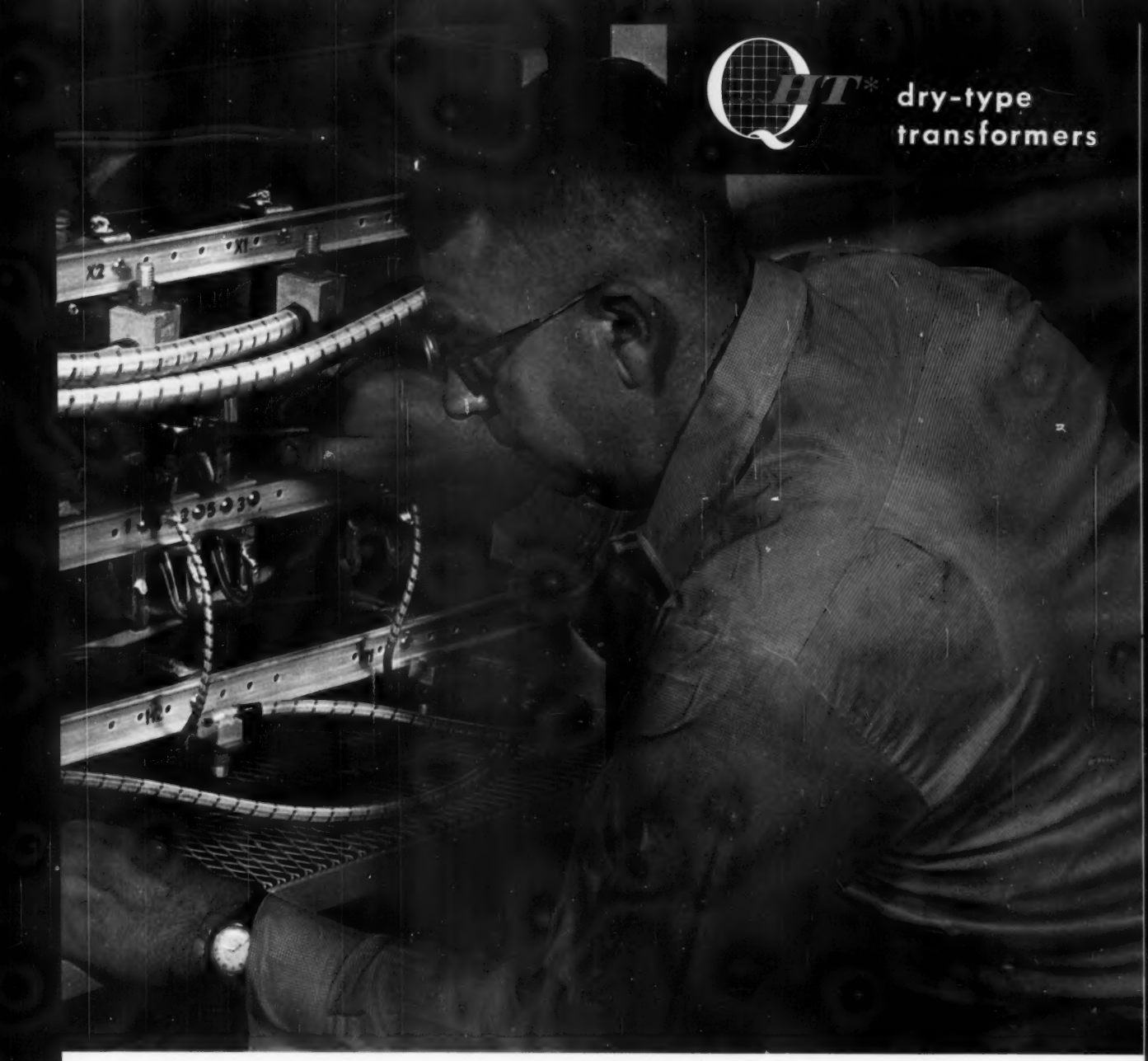
Keyhole slots hold QHT transformer in place. Built-in mounting provisions eliminate need for wall brackets.



Hook up this General Electric QHT transformer in only 18 minutes

You save time and money every time you install a General Electric QHT dry-type transformer.

First, QHT transformers are easy to handle. They offer savings up to 50 percent in weight and 67 percent in size compared with other dry-types. You can place QHT units near the load and save the cost of long, low-voltage feeders. They don't require vaults, barriers, or ventilating fans.



Entire front panel is removable to expose all terminal and tap connections. All connections are up front.

Second, you wire QHT transformers from the front. There's a complete wiring diagram on the nameplate. Dual-sized conduit knockouts are placed so that you can run cable straight into the connectors. And large, roomy terminal compartments, solderless connectors, and numbered terminals help you to complete wiring in 18 minutes.

The new General Electric QHT dry-types are quiet at least 15 decibels quieter than older designs, making them ideal for schools, hospitals, office buildings, and other places where noise could be a problem. All QHT units have sound ratings equal to or less than NEMA standards. On larger units, welded steel clamps minimize core vibration. The core assembly is mounted on built-in rubber pads to reduce noise transfer through conduits and mounting brackets.

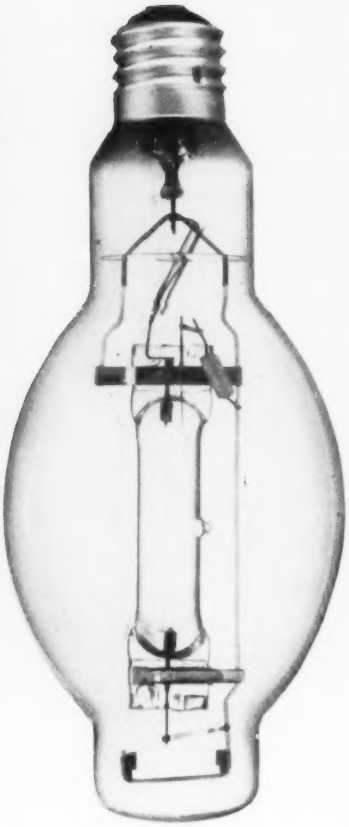
You can get 24 hour delivery on most models from your nearby General Electric distributor. For more information, call him today or write to Section 411-17, General Electric Co., Schenectady 5, N. Y.

* Registered trademark of General Electric Co. for quiet, high-temperature dry-type transformers.

Progress Is Our Most Important Product

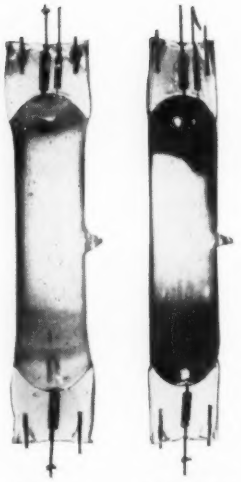
GENERAL ELECTRIC

6000 USEFUL HOURS EXTRA



New G-E "Bonus Line" Mercury Lamps. 6000 extra hours! That's the bonus your customers get in every 400-watt G-E "Bonus Line" Mercury Lamp . . . and a minimum of 3,000 hours extra in the other wattages. One look at these two light-producing arc tubes and you can see why General Electric "Bonus Line" Mercury Lamps are their best bargain. See how the one from a G-E Lamp stays white? That's because its special electrode doesn't deposit a *black* coating, but a translucent *white* coating that lets the light come through. The result: your customers get as much light at *9,000* hours as ordinary mercury lamps give at *3,000* hours. General Electric "Bonus Line" lamps now available in *all* sizes from 100 to 1,000-watts . . . in all popular shapes and "colors" . . . *at new low prices.*

Men in the know . . . know they get important differences when they specify General Electric Lamps—whether they're mercury, filament or fluorescent. So let your General Electric Lamp distributor explain the important plus you can get in the lamp types you use. General Electric Company, Large Lamp Department, C-033, Nela Park, Cleveland 12, Ohio.

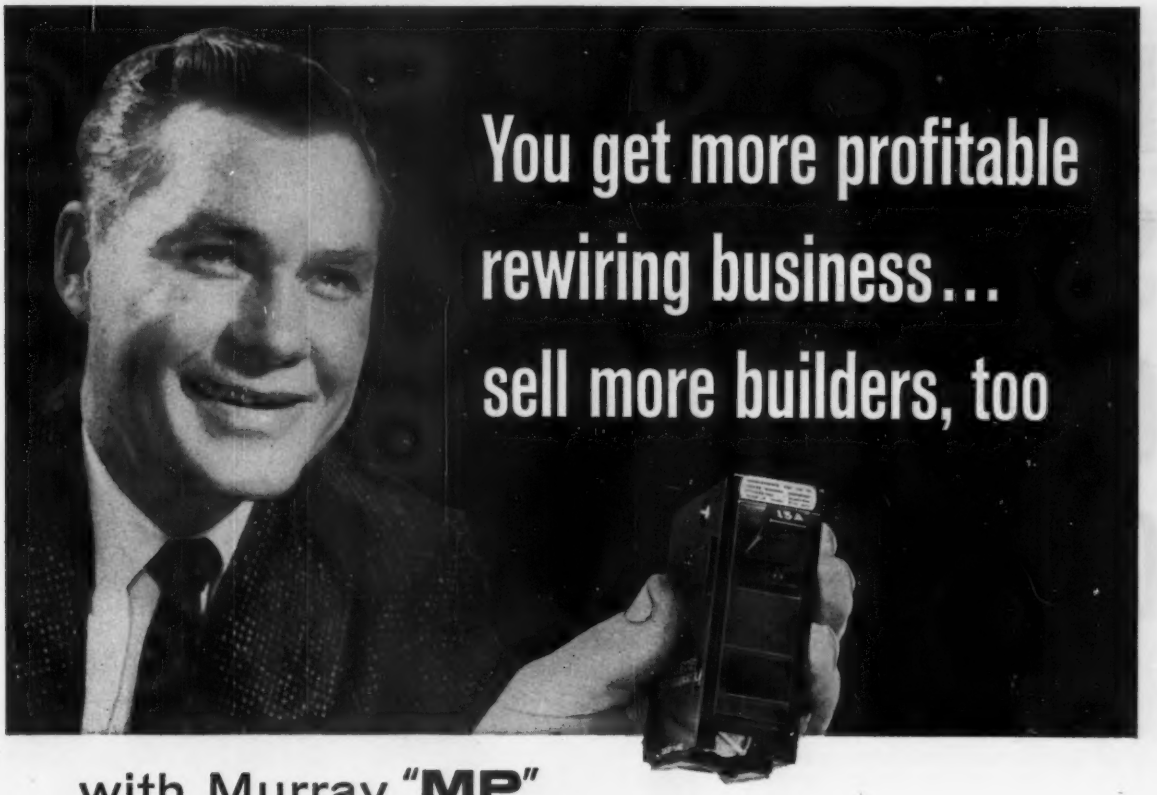


BONUS ARC TUBE AFTER 8000 HRS.

ORDINARY ARC TUBE AFTER 8000 HRS.

Progress Is Our Most Important Product

GENERAL ELECTRIC



with Murray "MP" GUARANTEED FOR LIFE Breakers

WHY SQUEEZE profits on rewiring jobs, when you can more easily sell quality jobs at profitable prices. By offering customers a breaker that's *guaranteed for life*, you win confidence, make your sales job easier.

Homeowners appreciate knowing that the breakers you install carry a *life guarantee*...won't quibble so much about price. Here's another advantage: the guarantee shows you're using the best, helps you build prestige in your neighborhood.

Extra Sales Advantage!
Builders, too, go for the *lifetime "MP" breaker guarantee.* It helps them sell against homes with less quality, gives them an extra sales edge in today's competitive market.

Show builders how "MP" breakers can turn more lookers into buyers... and you've practically made the sale.

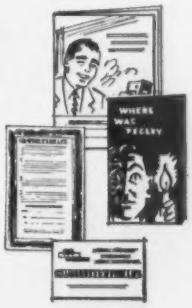
Easy To Install!
"MP" breakers are *fully magnetic.* They're unaffected by heat, never need derating, never trip unnecessarily, carry full rated load...and can be installed anywhere. You'll find jobs going up easier, faster...and at minimum expense. And there's an enclosure for every job in Murray's full line of load centers.

How To Cash In!
See your Murray distributor today. Ask him to show you all the promotional material he has available to help you sell. Or write Murray directly for details. Do it today.

These money-making sales aids help you sell more "Guaranteed For Life" breakers:

Guarantee Certificate
Load Center Sticker
Consumer Booklet
Builder Brochure

60TH YEAR Murray



Murray Manufacturing Corp., 1250 Atlantic Avenue, Brooklyn 16, N.Y.

Gentlemen:

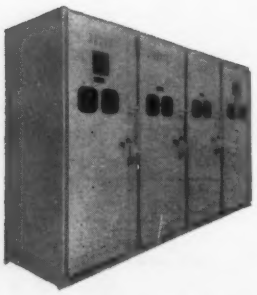
A circuit breaker that's *Guaranteed For Life!* I'm interested. As soon as possible, send me complete information on everything.

Name_____

Address_____

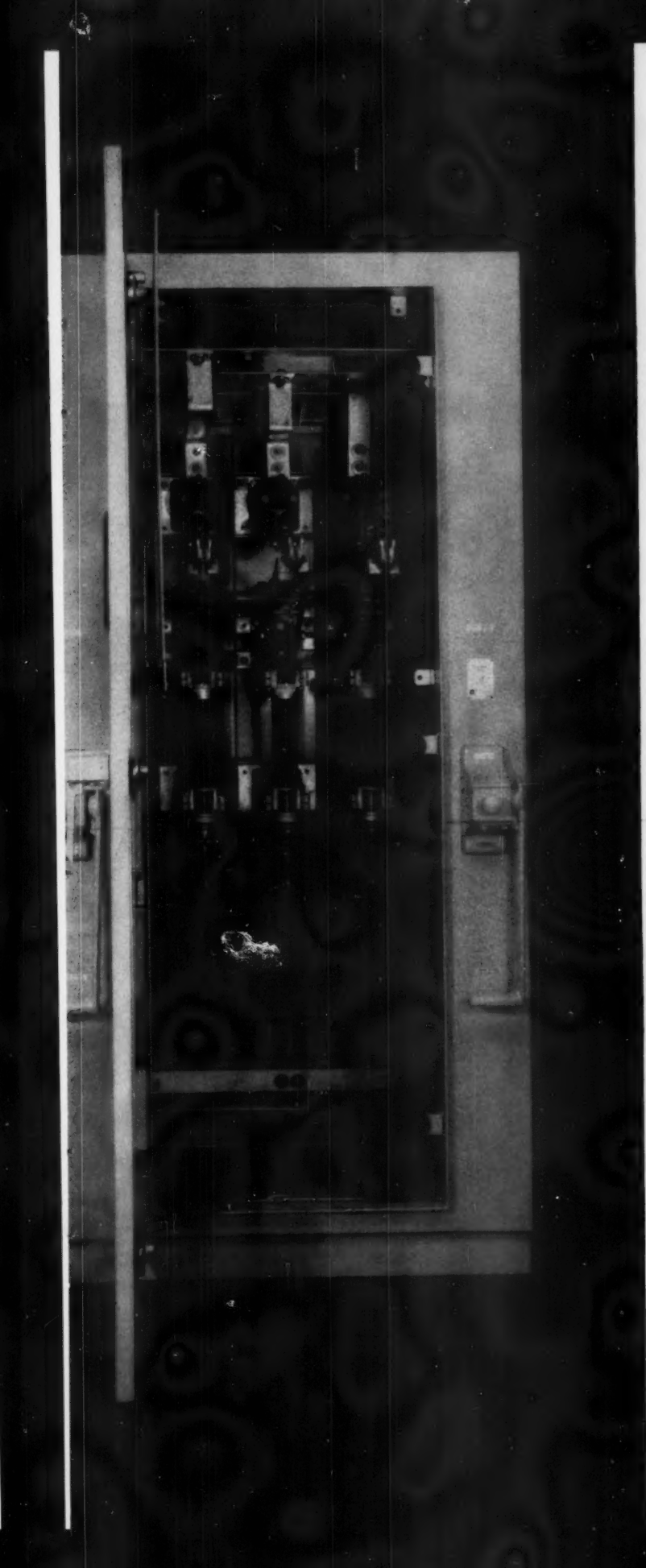
My wholesaler is_____

HOW SIMPLE CAN YOU GET?



S&C metalclad switchgear meets all National Electric Code requirements for fault closing, short-circuit interruption. Performance proved by high power testing at KEMA laboratories.

FUSE REFILLS



S&C metalclad switchgear is easy to operate, easy to maintain, easy to understand

The simplicity of the fused interrupters in S&C metalclad switchgear means that everyone from the consulting engineer to the electrical contractor to the plant engineer and electrician saves time, money, and effort. The power fuses give positive and permanently accurate protection against faults. The load interrupters provide full load switching and can close on any fault up to 60,000 amps (at 4.16 kv). The power fuse in series with the load interrupter takes the mystery and high cost out of high-voltage switch-gear for industrial plants and for commercial and industrial buildings.

Costing roughly half the price of comparably rated circuit-breaker equipment, S&C metalclad switchgear protects high-voltage power supply circuits with self-sufficient power fuses. Permanent faults are detected without the complicated relay systems or instrument transformers required with circuit breakers. (Transient faults do not occur on industrial or commercial power supply circuits. Thus the expensive repetitive and automatic reclosing features of circuit breakers are not needed.) After the fault has been corrected, simply replace the blown fuse with a $13.50 refill stored right in the enclosure door.

Operating instructions and installation are simple with S&C metalclad switchgear. Nothing to set, adjust, exercise or check out. Plant personnel find it easy to understand and operate.

Why not consider S&C metalclad switchgear for your high-voltage (2300 to 15,000-volt) power systems? For more information, please consult the telephone directory for your nearest S&C sales office. Or write to:

S & C ELECTRIC COMPANY

4433 Ravenswood Avenue • Chicago 40, Illinois

Specialists in High Voltage Circuit Interruption since 1911

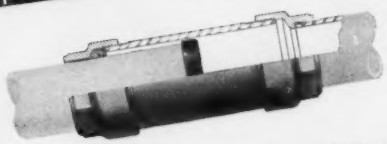
S&C

in the long run... it's O.Z.

Type AX

Provides 4" expansion, contraction movement. Malleable iron head, body Hot Dip Galvanized. Weatherproof head sealed by factory-installed high grade graphite packing. Insulating conduit end bushing eliminates cable abrasion. 10 sizes for conduit ½" to 4" diameters.

Type EX



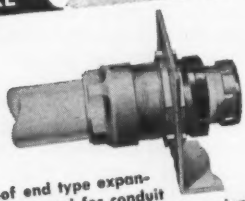
Permits 8" conduit movement. Optional length sleeves, additional cost. Weatherproof head sealed by factory-installed high grade graphite packing. Insulating bushings prevent cable abrasion. Hot Dip Galvanized finish. 12 sizes for ½" to 6" conduit diameters.

Type DX

Patented

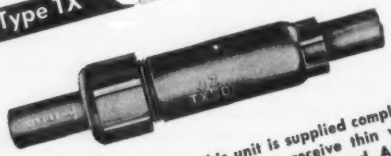
Compensates for deflection, expansion, contraction. ¾" movement all directions from normal; 30° angular movement. Also used as vibration damper between conduit sections. 10 sizes. Watertight (NEMA 4) and submersible under 25 ft. head of water.

Type EXE



Weatherproof end type expansion fitting. Designed for conduit terminating in junction box, where expansion, contraction take place. Supplied complete: locknuts, bushings. Standard finish, Hot Dip Galvanized. 12 sizes.

Type TX



Similar to the Type AX, this unit is supplied complete with extension nipples, ready to receive thin wall couplings. Standard finish is cadmium plated. Available in 6 sizes for conduit ranging from ½" to 2".

for the longer line of EXPANSION FITTINGS

In the long run, no line of conduit is more dependable than its components. When it comes to dependability in expansion fittings, look to O. Z. as the line that measures up! Five basic types provide the dependable answer to your fitting problems in conduit expansion, contraction, and deflection. O. Z. is the dependable line because it's the line with the *right size*, the *right type*, for every requirement! Types AX, DX, EX and EXE available in aluminum at no extra cost.

O.Z. ELECTRICAL MANUFACTURING CO., INC.

262 BOND STREET • BROOKLYN 17, N. Y.

- CAST IRON BOXES
- CABLE TERMINATORS
- POWER CONNECTORS
- SOLDERLESS CONNECTORS
- GROUNDING DEVICES
- CONDUIT FITTINGS
- INTERLOCKED ARMOR CABLE FITTINGS

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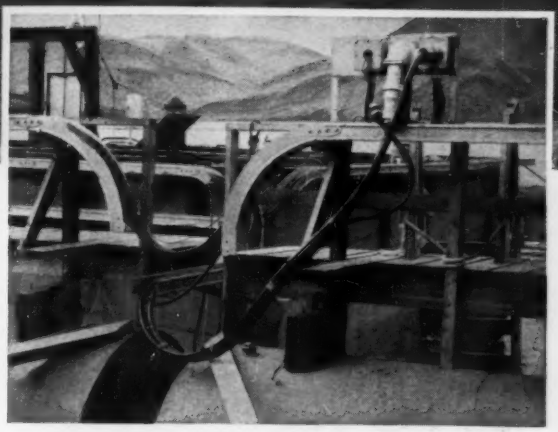


THIS IS THE "FISH NET"—stretching more than a half-mile across the reservoir behind Idaho Power Company's Brownlee Dam in the Hells Canyon reach of the Snake River, bordering Idaho and Oregon. The migrant fish facility, designed to save salmon and steelhead from a drop over the spillway of the 395-foot-high Brownlee Dam, depends on Okolite-Okoprene 600-volt power and control cable for continuous, all-weather operation. Fish trapped at three skimmer-barges attached to the net are taken by specially designed trucks for release down-river.

HERE IS CABLE'BILITY on the job, providing power to two 21,000-gallon-per-minute pumps which create artificial currents that lure the fish into channels in the trap. Multi-conductor control cable also enables a complicated maze of control equipment—almost completely automated—to be operated both from the barges and a shore station.

Cable'bility at work

Idaho Power chooses Okolite-Okoprene cables for power and control at "world's biggest fish net"

Cable'bility (cā'ble·bil'·i·ty) *new word. Noun.* **1.** Ability to design and manufacture electrical cables that give outstanding performance. **2.** Having long background and wide experience in cable research and application. **3.** Possessing keen understanding of customers' problems. Implies eagerness to serve faithfully and dedication to progress. **Syn.** The Okonite Company.

Okolite-Okoprene 600-volt power and control cable is at the heart of Idaho Power's new fish conservation facility behind Brownlee Dam in Hells Canyon, on the Idaho-Oregon border.

The "world's biggest fish net"—300,000 square feet in size behind the giant Snake River dam—depends on nine-conductor Okolite-Okoprene control cables to carry current to almost completely automated control equipment. And Okolite-Okoprene three-conductor power cables provide power to motors driving two 21,000-gallon-per-minute pumps which create artificial water currents, luring fish into channels in the trap.

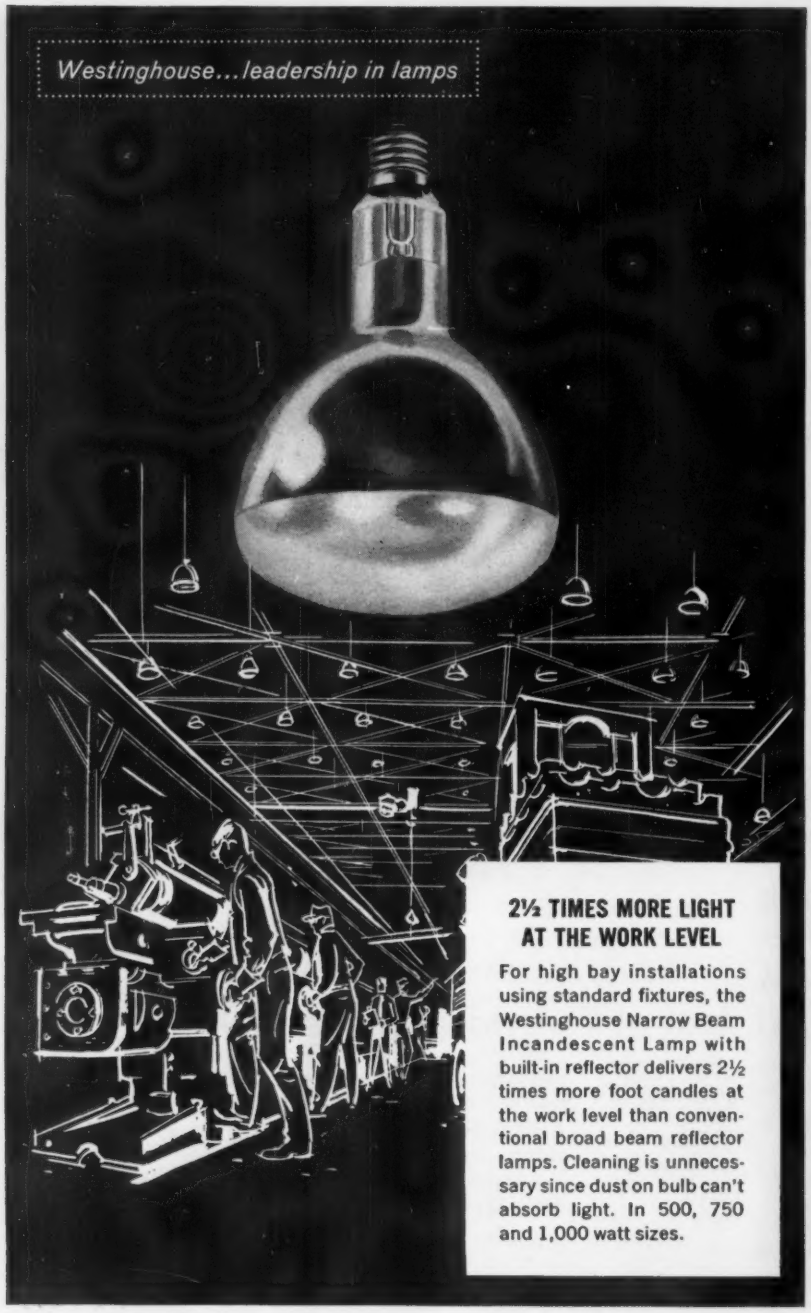
Both Idaho Power and International Engineering Company, the consulting engineers, specified Okolite-Okoprene for the project, seeking maximum operating dependability. The cables are constantly exposed to weather and, in the center section, are submerged in water. Their flexible stranding helps them withstand the movement of the barges on the lake, as well as handling during removal of barge sections or traps.

For the full story on Okolite-Okoprene, write for Bulletin EC-1085. The Okonite Company, Subsidiary of Kennecott Copper Corporation, Passaic, N. J.

where there's electrical power . . . there's **OKONITE CABLE**

7035-A

FOR HIGH EFFICIENCY, LOW-COST LIGHTING



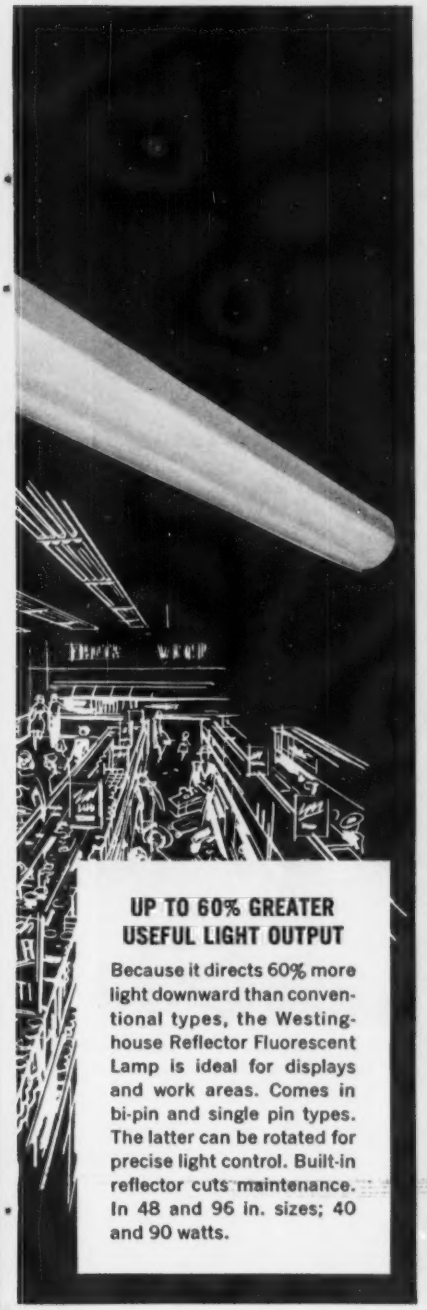
2½ TIMES MORE LIGHT AT THE WORK LEVEL

For high bay installations using standard fixtures, the Westinghouse Narrow Beam Incandescent Lamp with built-in reflector delivers 2½ times more foot candles at the work level than conventional broad beam reflector lamps. Cleaning is unnecessary since dust on bulb can't absorb light. In 500, 750 and 1,000 watt sizes.

The high efficiency lamps shown above demonstrate the ability of Westinghouse to reduce lighting costs. In the Westinghouse line you'll find the correct lamp to give you one or more of the following benefits: greatest savings in lamp purchases; lowest maintenance cost; the most light at the same or lower cost; the most efficient use of power. Call your Westinghouse Lamp Representative today. You can be sure . . . if it's Westinghouse.

Westinghouse Lamp Division, Westinghouse Electric Corporation, Bloomfield, New Jersey

...CHOOSE WESTINGHOUSE LAMPS



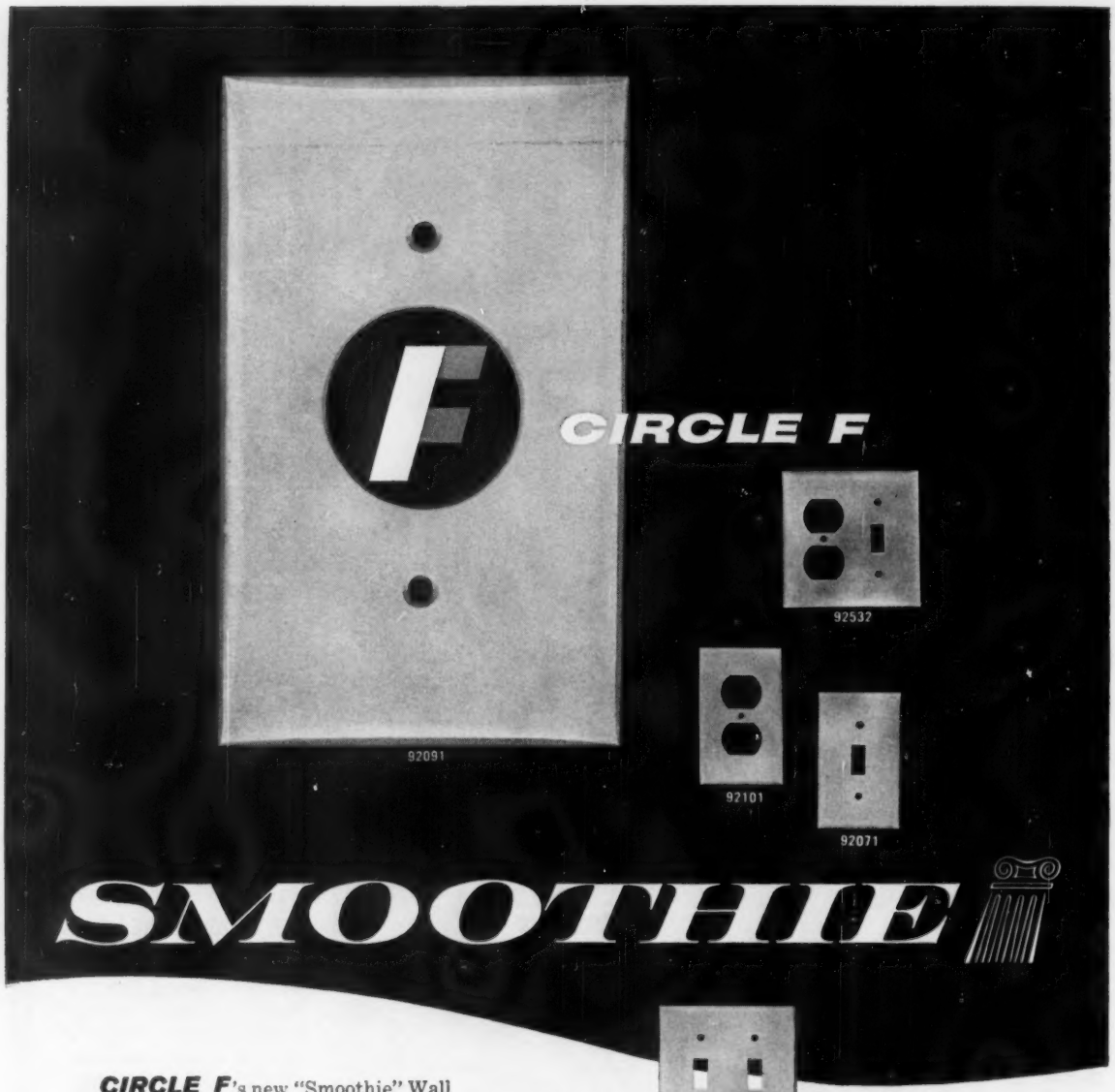
UP TO 60% GREATER USEFUL LIGHT OUTPUT

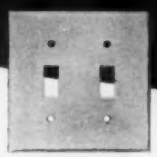
Because it directs 60% more light downward than conventional types, the Westinghouse Reflector Fluorescent Lamp is ideal for displays and work areas. Comes in bi-pin and single pin types. The latter can be rotated for precise light control. Built-in reflector cuts maintenance. In 48 and 96 in. sizes; 40 and 90 watts.

UP TO 20% MORE LIGHT THAN OLDER TYPES

Besides delivering up to 20% more light at the work level, Westinghouse Lifeguard Mercury Lamps maintain up to 86% of initial output after 9,000 hours of use and provide 12,000 hours of high light output. Lifeguard Arc Tube prevents darkening of glass with ensuing loss of light. In the long run, this is the most economical lamp you can buy. In 400, 700 and 1,000 watts.

Westinghouse

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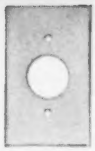
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92073

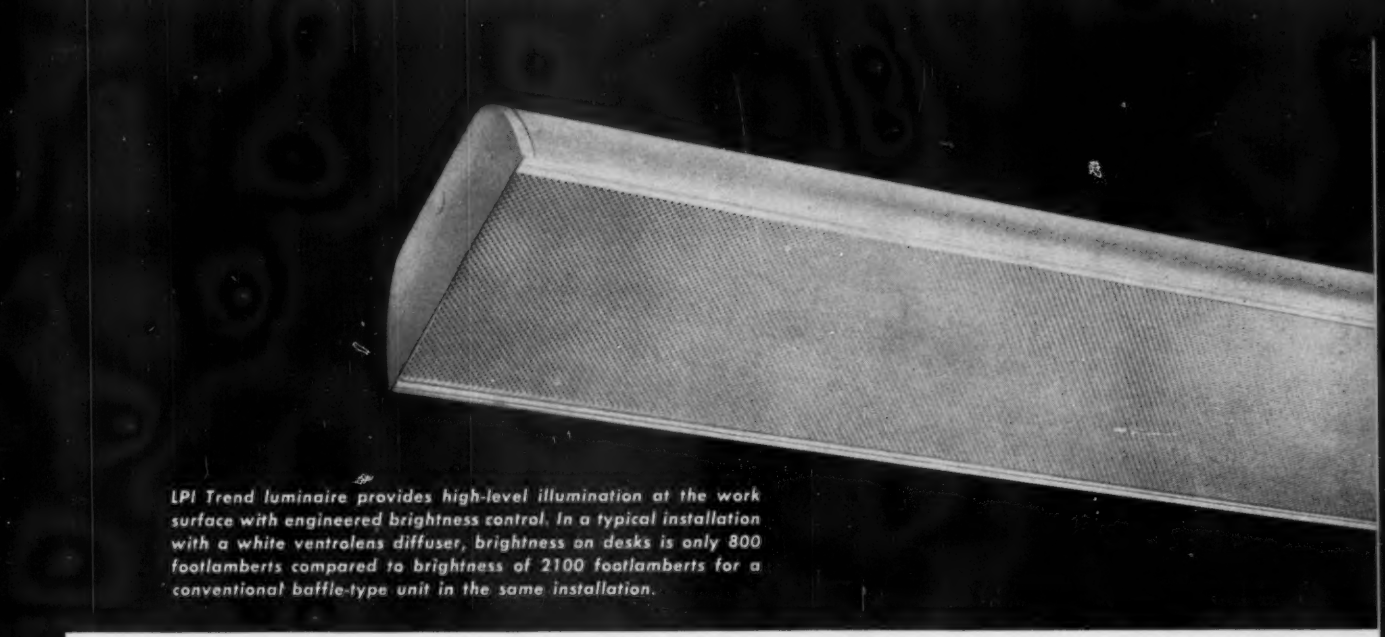
CIRCLE F's new "Smoothie" Wall Plates—smooth and clean in design—are ideal for residential, commercial and institutional applications. The completely smooth surface prohibits dust and dirt accumulation and makes these plates ideal for painting. The simple classic design with its compound parabolic curves blends well with modern or any other decor.

Moulded of non-combustible non-absorbing thermosetting plastic all Smoothie Wall Plates have reinforced rib construction to give added strength and eliminate warping. All Smoothie plates are individually packaged in cellophane and have an envelope containing mounting screws sealed in the package.

See your distributor or write us direct.

CIRCLE F MFG. CO.

TRENTON 4, NEW JERSEY



LPI Trend luminaire provides high-level illumination at the work surface with engineered brightness control. In a typical installation with a white ventrolens diffuser, brightness on desks is only 800 footlamberts compared to brightness of 2100 footlamberts for a conventional baffle-type unit in the same installation.

New LPI Trend luminaire provides high-level illumination, meets recommendations for visual comfort

Visual comfort at high illumination levels is now attainable in schools and offices with the new, economical LPI Trend series.

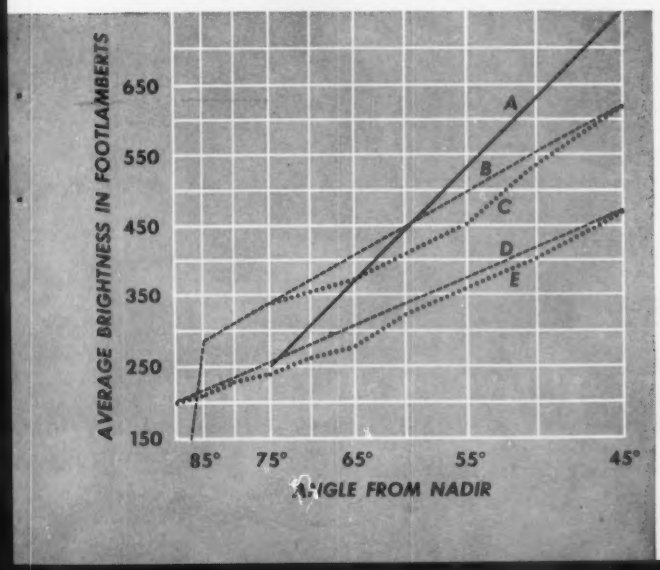
The design of the Trend luminaire combines luminous side panels with efficient diffusers. Both are engineered in shape and transmission characteristics to provide increased foot-candle levels while closely approximating the Illuminating Engineering Society's "scissor curve" for visual comfort.

The new design with luminous, wrap-around side panels makes the Trend luminaire efficient and attractive. Direct glare is well below levels commonly associated with conventional fixtures. The series offers a choice of three types of diffusers—clear ventrolens, white ventrolens to achieve minimum reflected glare, and a new polystyrene egg crate louver which provides 55° shielding both crosswise and lengthwise.

Trend series luminaires are offered in the following sizes for 430 ma rapid-start lamps: 4 ft. x 12 in. unit for two lamps; 8 ft. x 12 in., tandem arrangement for four lamps; 4 ft. x 16 in. for four lamps.

Visual comfort of the new Trend luminaire is depicted in the adjoining chart according to the "scissor curve" method recommended by the Illuminating Engineering Society. Average brightness levels are obtained in the crosswise and lengthwise directions at angles between 45° and 90° from nadir and are plotted on a chart. Also plotted is a straight line representing the I.E.S. recommended brightness limit and straight lines representing the luminaire's own brightness limits in the two directions. Because brightness measurements of the Trend luminaire in the critical crosswise direction fall below these lines, the luminaire may be said to meet I.E.S. recommendations for crosswise brightness control. Lengthwise measurements closely approach these recommendations and are well within the comfortable range.

For complete information on these attractive, moderately priced luminaires, write for LPI's Trend Bulletin.



LPI FLUORESCENT LIGHTING

Lighting Products Inc., Highland Park, Illinois

Plot of average brightness in footlamberts in plane normal to lamps (crosswise of luminaire) and plane parallel to lamps (lengthwise of luminaire) for pendant-mounted LPI Trend luminaire—Catalog No. 7840-4, with CBM ballast and two F40T12/CW/RS lamps

A—I.E.S. recommended brightness limit (75°-45°)
B—Trend luminaire brightness limit—lengthwise
C—Trend luminaire average brightness—lengthwise
D—Trend luminaire brightness limit—crosswise
E—Trend luminaire average brightness—crosswise

NOW... *a simple, effective, low cost method of preventing electrical failure due to moist and corrosive atmospheres*

Failure of physical or electrical characteristics of electrical and electronic equipment is often due to moisture and corrosion. Without effective moisture protection, deterioration sets in, leading to costly downtime, expensive repairs and high replacement incidence.

Dual-action CRC 2-26 eliminates or greatly reduces these failures. It displaces moisture on surfaces—gets into grain boundaries, cracks and pores—and leaves a thin, continuous molecular film that both stops and prevents corrosive action on metals, plastics, rubber, plated and painted surfaces.

Dimensional characteristics, contact resistance and other electrical constants remain unchanged. CRC 2-26 does not become dry, brittle or hard. Because it is non-irritating, non-toxic and has a high flash point, CRC 2-26 is easily applied without special precautions. It is used to maintain equipment year after year that formerly burned out or needed extensive servicing every few months.

Write for complete information to Corrosion Reaction Consultants, 116-A Chestnut St., Philadelphia 6, Pa., or telephone WAlnut 5-0200.

A SUBSIDIARY OF THE CHAS. J. WEBB SONS CO., INC.

Place your order now with your Electrical Distributor

CRC® FORMULA 2·26

FOR THE ELECTRICAL INDUSTRY

TYPICAL EQUIPMENT MAINTAINED BY CRC 2-26

Switchgear	Motors	Blowers	Rheostats
Circuit breakers	Generators	Signals	Sub-assemblies
Contactors	Cables	Controls	Synchronizers
Fuses	Insulation	Recorders	Transmitters
Relays	Coils	Shielding	Receivers
Solenoids	Timers	Counters	Ignition systems
Rectifiers	Conduits	Housings	Microphones
Transformers	Fixtures	Chassis	Tubes
Instruments	Panelboards	Oscillators	Welders

Supplied in 16 oz. aerosol cans, 1 and 5 gal. cans, 55 gal. drums

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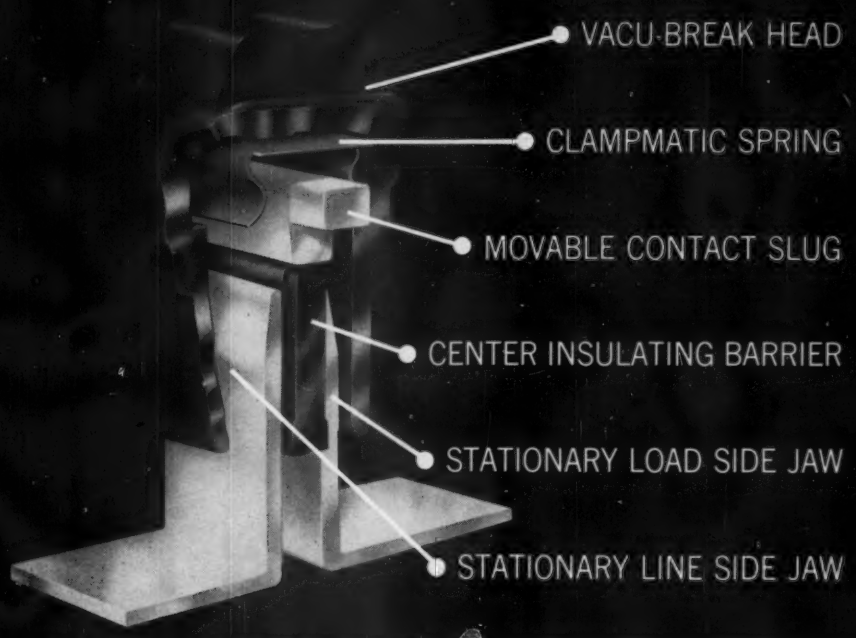
CRC®

2·26 LOW COST PROGRAMS FOR PREVENTIVE MAINTENANCE



THE INSIDE STORY...

Why switches last longer with clamped pressure contact and Vacu-Break arc control

This BullDog Vacu-Break® Switch Head is the reason why Vacu-Break switches stay in action longer.

See how the unique Clampmatic® spring clamps the contact slug firmly between the line and load jaws . . . provides a virtual bolt-tight connection! This clamped pressure contact prevents overheating while in the "on" position—and as the switch moves to "off," the spring speeds the break. Both features mean longer switch life for your customers.

Equally important to longer switch life is the action of the Vacu-Break head. Arc chambers enclose the switching contacts. When contacts are broken under load, arcs are smothered quickly. Pitting and burning are cut to the absolute minimum, thereby minimizing maintenance.

BullDog Electric Products Division, I-T-E Circuit Breaker Company, Box 177, Detroit 32, Michigan. In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Division: 13 East 40th St., New York 16, N. Y.

For Safety's Sake Buy Vacu-Break

BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY

KEEP PACE WITH ELECTRICITY

Vacu-Break switch units with clamped pressure contacts are available in BullDog Safety Switches, Switchboards, Vacu-Break Power Panels and Bus Plugs. They cost no more and give your customers the maximum in safety and performance. See your BullDog distributor.

SPECIFY CLIFTON CONDUIT

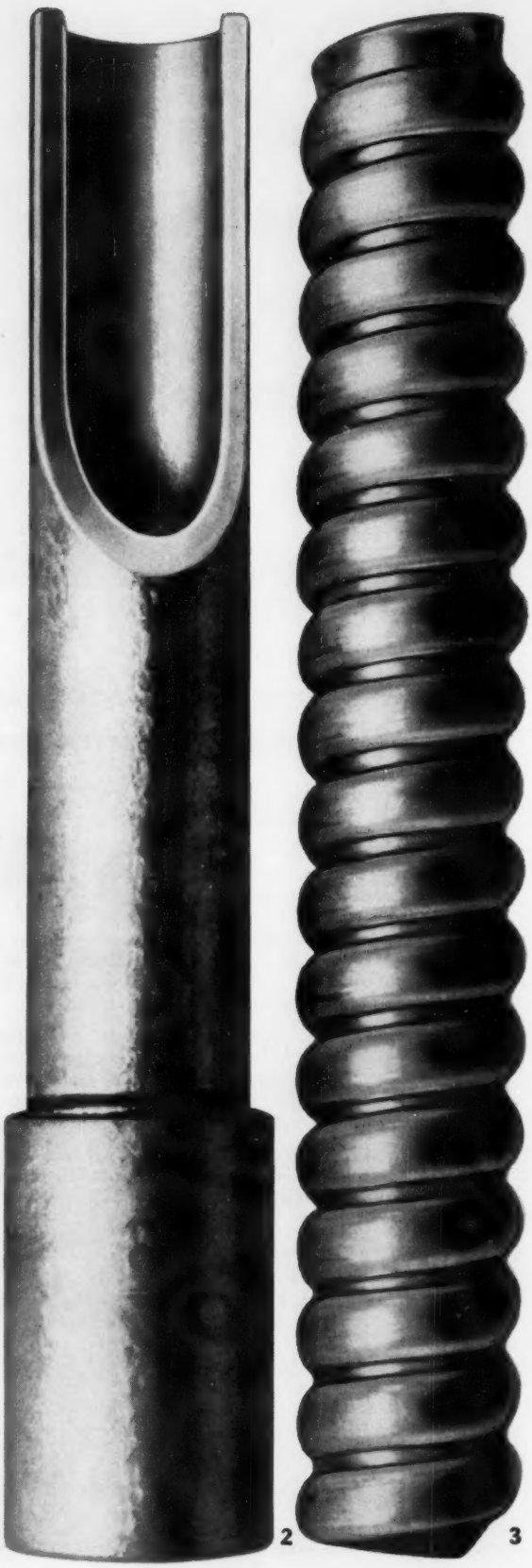
The conduit with built-in quality

1 **EMT** (Electrical Metallic Tubing) the only hot-dipped galvanized tubing—inside and out for complete protection • flat, clean, continuous weld for smooth interior surface and ease of pulling during installation.

2 **RIGID CONDUIT** made of the finest steel available • Clifton's exclusive process for hot-dipped galvanizing guarantees a uniform zinc protective coating ... inside and out • the finest rigid conduit made. Clifton Rigid Conduit is approved by Underwriter's Laboratories, Inc. and conforms with Federal Specification WW-C581C and ASA Specification C-80.1-1953. Clifton EMT is approved by Underwriter's Laboratories, Inc. and conforms with Federal Specification WW-T-806B and ASA Specification C-80.3-1953. RIGID CONDUIT ELBOWS, COUPLINGS, AND NIPPLES in a full range of sizes • are manufactured of the same fine high quality steel as RIGID CONDUIT • hot dipped galvanized inside and out.

3 **FLEXIBLE STEEL CONDUIT** really flexible and crush-resistant for easier and faster installations • manufactured under Clifton's rigid controls from purchase of high quality steel tape to finished product • smooth inside surface assures you trouble free pulling during installation. Clifton Flexible Steel Conduit is approved by Underwriter's Laboratories, Inc. and conforms with Federal Specification WWC-556. Other quality products by Clifton: Bushed Armored Cable; Unarmored Service Entrance Cable; (CLIFTX) Non-Metallic Sheathed Cable; CLIFTALL-UF; Building Wire —TW, RHW, RR.

CLIFTON CONDUIT CORPORATION
A Division of General Cable Corporation
3300 Eastbourne Ave., Baltimore 24, Md.



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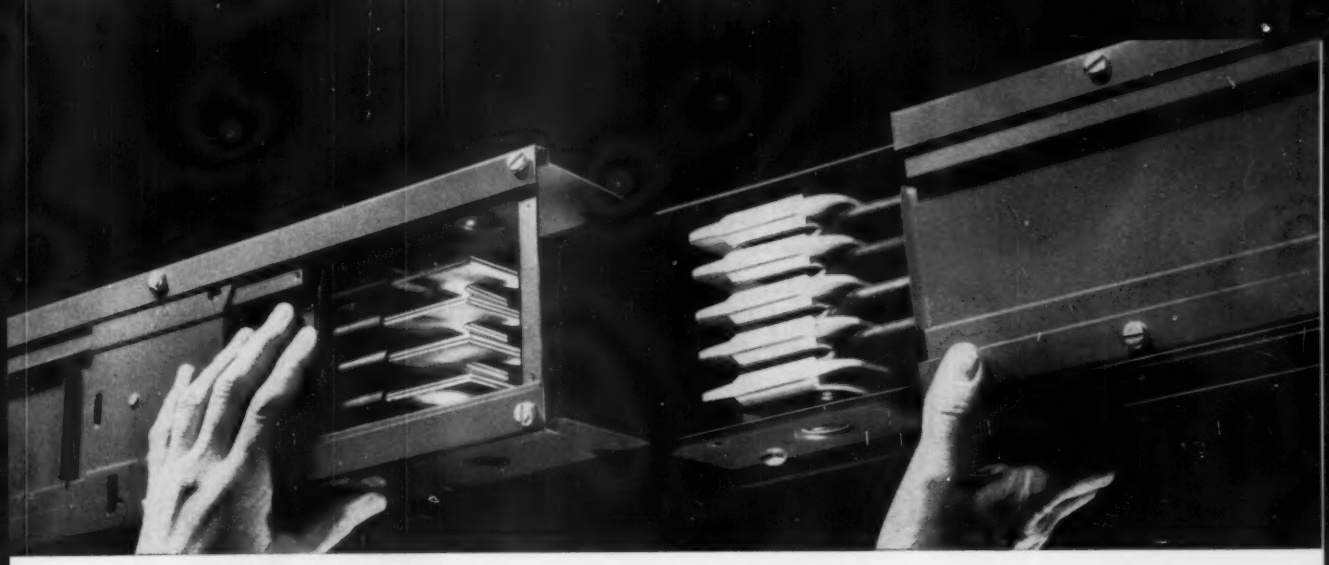


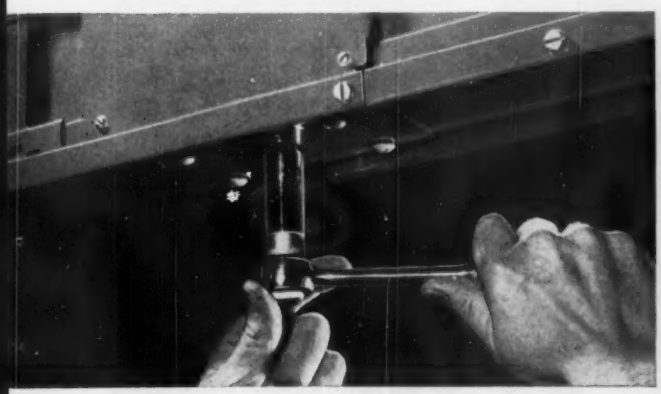
NEW BULLDOG XL BUSTRIBUTION DUCT

CUTS INSTALLATION TIME 3 WAYS

You can install XL BUStribution® Duct easier, faster than any other duct because of these exclusive new design features . . . plated aluminum bus bars with KEYED ENDS slip together fast, align automatically for proper position. There's no fumbling and fitting . . . ONE INTEGRAL BOLT tightens fast, locks joint positively under a ton of pressure. Bolt tightens against bus bar, not against the casing . . . TEN-FOOT SPANS take fewer hangers and less time to install than ordinary duct.

New XL BUStribution Duct is 3 ways safer, too. It's the only true dead-front duct, the only one with exclusive Safety Door, the only one with Safety Plug. And it reduces duct weight on building structure as much as 40%. Ask your BullDog distributor to arrange for a demonstration . . . you'll see how fast to install and how safe new XL BUStribution Duct really is.

BullDog Electric Products Division, I-T-E Circuit Breaker Company, Box 177, Detroit 32, Michigan. In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Division: 13 East 40th St., New York 16, N. Y.



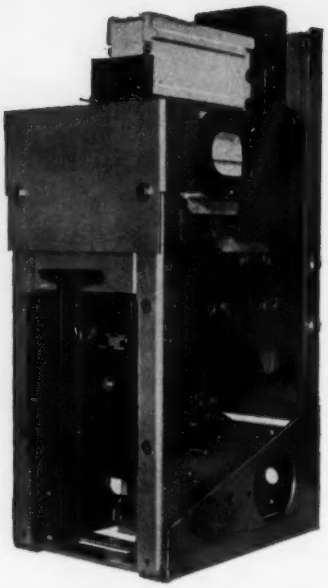
SINGLE INTEGRAL BOLT puts a ton of pressure on keyed bus ends. Joints lock tight *fast*, stay locked.

TEN-FOOT SPANS take fewer hangers and less time to install than ordinary duct.

BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY

KEEP PACE ELECTRICALLY

The d-c breaker you can buy today that won't be obsolete tomorrow



Stationary type single-pole FB breaker in 1200 amp rating with manual stored energy closing.

Actually this new-design model FB circuit breaker from I-T-E is somewhat of a phenomenon in its field. Of all breakers available for direct current, this is the only one that really makes use of today's modern materials and up-to-date knowledge of circuit breaker design. You might say it's the only modern d-c circuit breaker on the market today.

HIGH SPEED

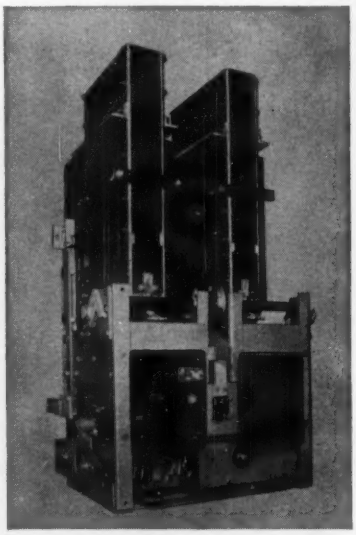
In today's high-capacity d-c circuits, you *need* a high-speed breaker. Otherwise you risk thermal or mechanical damage to equipment—such troubles as commutator flashover in rotating equipment or arc-back damage to your rectifiers. Many circuits today still have semi-high-speed breakers that don't give adequate protection. At the time they were installed they may have been the best available. Or else high-speed breakers were too expensive. That isn't true with the FB. Without paying a premium price, you get high-speed operation. Current limiting action occurs *within 6 milliseconds*. And the breaker may be safely applied to 1000 volt d-c circuits having a rate of rise of 15 million amperes per second. So the FB breaker can be used with confidence in practically all d-c circuits.

COMPACT SIZE AND LIGHT WEIGHT

Probably the most obvious difference between the new FB breaker and some of the old-design models still being sold is the greater compactness. This is one of the direct results of modern materials and technology. I-T-E engineers have given you actually superior circuit protection in less space. And the use of modern materials has shaved off many pounds of weight. Because of this they are now available in general-purpose enclosures. In addition, such new-design details as tilting arc chutes, elimination of flexible connectors, and exclusive drawout construction make this the easiest-to-maintain d-c circuit breaker you ever saw.

AVAILABLE IN 1 OR 2 POLES

If you are operating a single-wire grounded system, a single-pole circuit breaker arrangement will suffice. But suppose you are operating a 2-wire, ungrounded system. Then a 2-pole circuit breaker is desirable. And only the I-T-E model FB offers it. This is real 2-pole construction, with both poles fully integrated mechanically and electrically for simultaneous opening and closing under all conditions.



Drawout type 2-pole breaker in 6000 amp rating, electrically operated.

REALLY FUNCTIONAL MECHANICAL ADVANCES

Who but I-T-E would be first to give you an advance such as manual stored energy closing in a d-c circuit breaker? No slow burning of contacts with the FB. It closes in roughly 1/12 to 1/6 second for greater safety and longer contact life. You have your choice of either manual or electrical closing. The motor-operated closing mechanism draws only 5 amperes—a great advantage over the usual 50 amperes required by solenoids. Precision construction typical of I-T-E equipment, coupled with drawout design, permits complete interchangeability of breakers and parts in breakers of equal rating.

REPLACE NOW

There's questionable economy in trying to stretch out the life of old equipment that can mean costly downtime and inadequate protection. The wiser move is to replace now with new-design model FB breakers that are far ahead of the field. Models in capacities from 1200 through 12,000 amperes continuous and 1000 volts d-c. Write for the new detailed and illustrated Bulletin 4601-1A. I-T-E Circuit Breaker Company, Dept. SW, 1900 Hamilton St., Philadelphia 30, Pa.

I-T-E CIRCUIT BREAKER COMPANY

59TH YEAR • SEPTEMBER, 1960

ELECTRICAL CONSTRUCTION AND MAINTENANCE

Low-Voltage for Pools

One of the most spectacular sales phenomena of current times is the booming business in home swimming pools. From king-size bathtubs to pools of olympic dimensions, they come in all sizes and shapes, of prefab or custom construction. And, naturally, some have the ultimate charm of attractive underwater lighting.

Unfortunately, there is also a growing number of reports of fatal accidents associated with electric shock in lighted swimming pools. In the common wet-niche installation, the 120-volt lighting fixture and a part of its connecting cord are immersed in the pool. Precision manufacturing and expert installation provide, initially, a reasonably safe system. But, in the typical home pool, expert maintenance is unlikely. Carelessness and even abuse are almost inevitable. Yet, continued safety depends critically upon reliable grounding, correct circuiting, complete insulation integrity and thoroughly watertight assembly under exceptionally adverse environmental conditions.

The electrical industry should take a realistic position on this problem before it gets out of hand. Line voltage underwater lighting is convenient but potentially dangerous if safety provisions are impaired or defeated. An obvious alternative is the use of a low-voltage supply system inherently incapable of delivering a disabling shock under the worst possible conditions of a direct line-to-ground contact hazard underwater.

A low-voltage supply system can be made inherently safe by a wide margin. Present 120-volt lighting equipments can be easily modified for low-voltage lamps. Larger circuit conductors would be required, but large line losses can be tolerated as they are readily compensated for by transformer taps.

Speedy industry action is essential. A new and inherently safe system must be developed and put to wide use quickly before public authorities act to forbid underwater pool lighting entirely—a prospect which is by no means remote in some areas today.

Code authorities have an urgent job. The code is now silent on swimming pool lighting. A crash program for industry guidance is needed. It may be necessary to severely limit line voltage installation to projects where professionally competent maintenance and regular reinspection can be guaranteed. Specific rules for low-voltage installations are also needed to insure that conditions will remain inherently safe without expert care.

Swimming pool shock hazards are sure to be widely discussed at the forthcoming IAEI Section meetings. It is to be hoped that prompt action will follow at the code-making levels. Stricter rules and enforcement procedure may be feasible for commercial and institutional installations, but the maintenance of home pool installations is impossible to control. The safest course is to keep line voltages well away from the pool area.

Wm. T. Stuart

Get starter modifications . . . fast . . . from your General Electric distributor

When a last minute change in application requirements necessitates immediate modification of a magnetic starter, call your General Electric apparatus distributor. He can provide the proper modification kit right off the shelf. Even when your starter is installed, it can be modified on the job in minutes.

Your General Electric distributor stocks industry's most complete line of modification kits. This means he can supply nearly any starter you need—when you need it.

Modifications are easy to make. All necessary parts are included in each kit, and a screwdriver is the only tool needed.

Kits for magnetic starters are available for mounting push buttons, selector switches, or indicating lights in starter enclosures; for adding auxiliary contacts and third overload relays; for changing coils and fuse clips.

For more information, contact your General Electric apparatus distributor or sales office. Or request publication GEA-7020 from General Electric Company, Section 812-03, Schenectady 5, N. Y.

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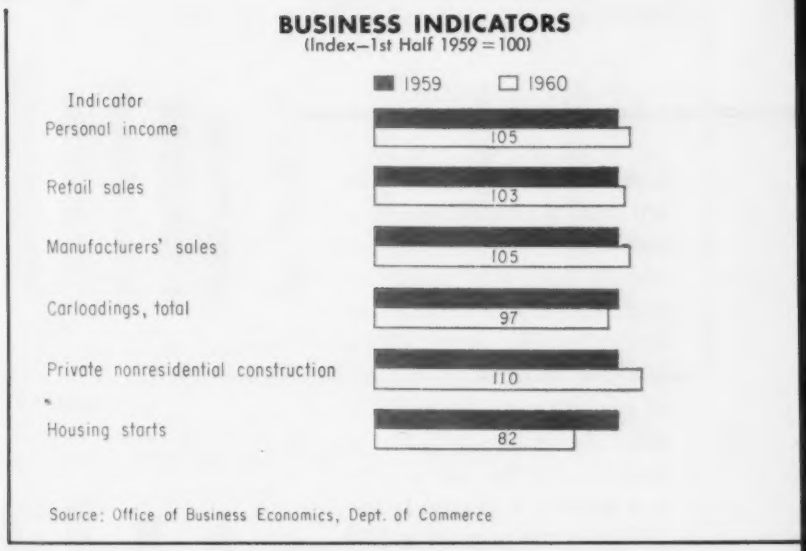
ELECTRICAL CONSTRUCTION AND MAINTENANCE



TRENDS POINT TO

Continuing Electrical Progress

THROUGH 1961

A growing national economy, prospect of a record year in building construction, and continuing progress in electrical equipment designs, standards, and technology all point to continued electrical growth and progress in the year ahead.

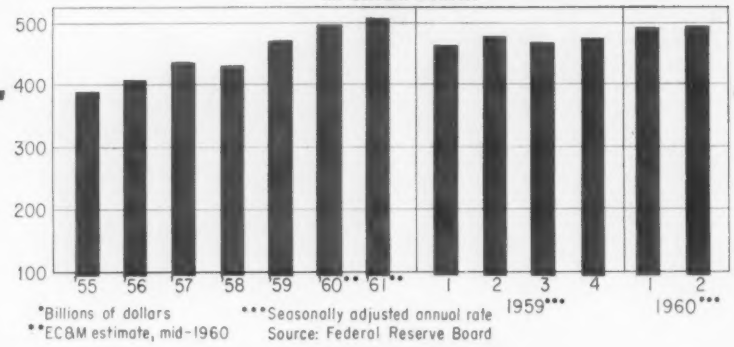
By Berlon C. Cooper

THE NATIONAL ECONOMY

THE national economy in the third quarter of 1960 has slowed to something less than a normal growth rate. It is, however, at the highest level in history, and is continuing to inch upward, even though at a generally disappointing rate.

At the end of 1959 most economists expected the economy to set new growth records during 1960, especially in production, personal income, retail sales, housing, employment, and some other fields, including gross national product. Such growth was expected to last through most of 1960, at least, as

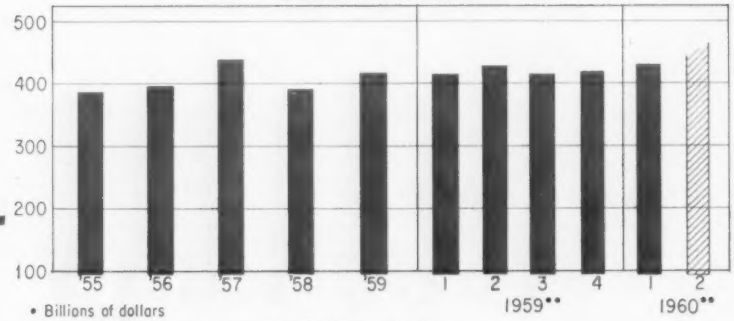
GROSS NATIONAL PRODUCT
(In Current Dollars)*



*Billions of dollars
**EC&M estimate, mid-1960
***Seasonally adjusted annual rate
Source: Federal Reserve Board

Economic growth, as measured by the total output of goods and services, or gross national product (GNP), has been relatively steady over the past six years. Measured in current dollars, the increase from 1955 through 1961 is 27.6%, or an average of about 4% per year. Measured in constant (1954) dollars, the increase is 12.6%, or about 2.0% per year. GNP for 1961, as a minimum, is expected to total $517 billion, may go as high as $525 billion.

GROSS NATIONAL PRODUCT
(In Constant (1954) Dollars)*

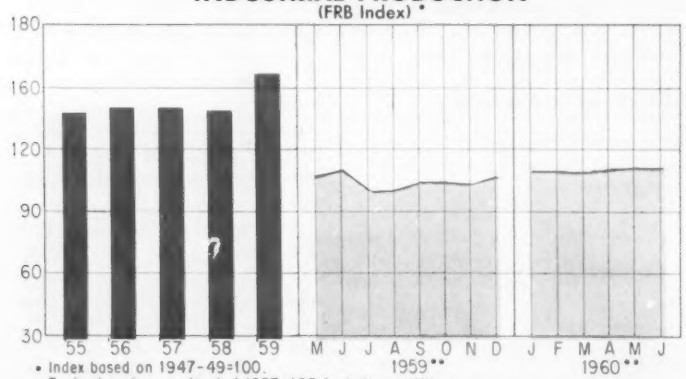


* Billions of dollars
** Constant (1954) dollars, seasonally adjusted annual rate

a result of the slowdown during the last half of 1959, which was brought about by the extended steel strike. Such growth was needed, it was agreed, to replenish inventories, to meet new housing demands, to fulfill demand for new compact autos, and both durable and nondurable goods.

Gross national product has reached new highs, and during the third quarter of 1960 is at an annual rate of about $510 billion. This, however, is some $5 to $7 billion less than had been generally predicted. Industrial output has held within about a 1% range since the beginning of the year, but steel production slid from about 95% of capacity in January to just slightly above 50% of capacity during the summer months. Steel consumption has been at 70% or more of steel production capacity, which means that inventory stockpiles are being gradually used up. Auto manufacturers are now switching

INDUSTRIAL PRODUCTION
(FRB Index)*



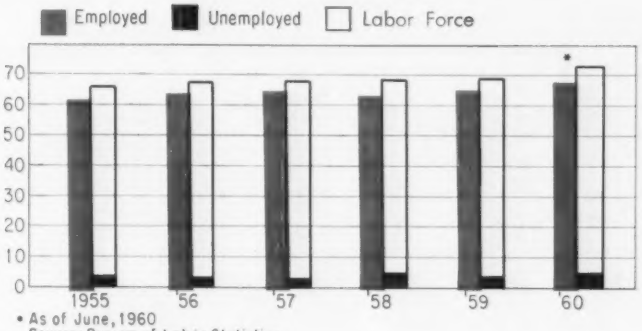
* Index based on 1947-49=100.
** Revised series, unadjusted 1957=100, including utilities.
Source: Federal Reserve Board and Survey of Current Business, Dept. of Commerce.

The FRB index of production has remained stable since January of this year, with a continuing decline in steel production offsetting improvements in other economic sectors. With steel inventories now nearly depleted, with expansion in production of both durable and nondurable goods taking place, and with government spending now being speeded up, an upturn in industrial production seems assured.

EMPLOYMENT AND UNEMPLOYMENT

(Thousands of Persons)

Employment reached an all-time record in June. This was expected, of course, as a large group of school students came into the civilian labor force, and set a new record of 73 million. But unemployment was also up, and the workweek in manufacturing this year has declined to 39.5 hours, compared with 40.5 last December, and 40.3 in April a year ago.



* As of June, 1960
Source: Bureau of Labor Statistics.

PERSONAL INCOME, TAXES, DISPOSABLE PERSONAL INCOME

(Billions of Current Dollars)

Personal income rose 22.5% between 1955 and 1959, for an average of 4% per year. During this same 5-year period, Federal tax on personal income rose 24.4%, and state tax rose 50%. This resulted in an increase of 21.9% in disposable personal income, from $274.4 billion in 1955 to $334.6 billion last year. Disposable income in the second quarter of this year was a seasonally adjusted $354.3 billion.

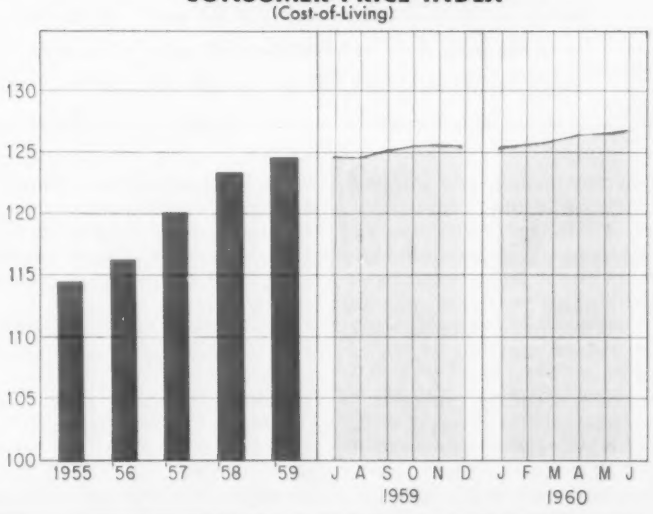
Year	Personal Income	Taxes		Disposable Personal Income
		Federal	State	
1955	310.2	31.5	4.2	274.4
1956	332.9	35.2	4.8	292.9
1957	350.6	37.4	5.4	307.9
1958	359.0	36.7	5.8	316.5
1959	380.2	39.2	6.3	334.6
Quarterly*				
1959—1st	371.8	38.2	6.2	327.4
2nd	381.1	39.5	6.3	335.3
3rd	381.0	39.5	6.4	335.1
4th	386.8	39.7	6.4	340.8
1960—1st	393.1	41.0	6.7	345.4
2nd				354.3

*Seasonally adjusted annual rates, by quarters.

CONSUMER PRICE INDEX

(Cost-of-Living)

Cost-of-living rose a total of 12 index points only from 1955 to June of this year, with the index based on 1947-49 average as 100. Medical care, one of the many items comprising the Consumer Price Index, showed the greatest growth, or 156.1% of the 1947-49 average.



CONSUMER SPENDING

(Billions of Dollars)

Year	Durable Goods	Nondurable Goods	Services	Personal Consumption Expenditures
1955	39.6	124.7	92.6	256.9
1956	38.6	131.4	99.9	269.9
1957	40.4	137.7	107.1	285.2
1958	37.3	142.0	114.2	293.5
1959	43.4	147.6	122.8	313.8
Quarter				
1959—1st	41.6*	145.3*	119.2*	306.1*
2nd	44.4*	147.7*	121.4*	313.6*
3rd	44.0*	148.0*	124.1*	316.0*
4th	43.5*	149.6*	126.6*	319.6*
1960—1st	43.7*	151.1*	126.3*	321.1*
2nd				328.5*

*Seasonally adjusted annual rates by quarters.
Source: Office of Business Economics, Dept. of Commerce.

CONSUMER CREDIT

(Millions of Dollars)

Year	Installment Credit	Noninstallment Credit	Total Consumer Credit
1955	28,958	9,924	38,882
1956	31,897	10,614	42,511
1957	34,183	11,103	45,286
1958	34,080	11,506	45,586
1959	39,482	12,564	52,046
End of Quarter			
1959—March	34,234	10,691	44,925
June	36,135	11,387	47,522
Sept.	37,962	11,388	49,350
Dec.	39,482	12,564	52,046
1960—March	39,648	11,514	51,162

Source: Federal Reserve Board.

RELATION OF CONSUMER CREDIT TO CONSUMER SPENDING

Year	Consumer Credit*	Consumer Spending	Ratio—%
1955	38.9	256.9	15.1
1956	42.5	269.9	15.8
1957	45.3	285.2	15.9
1958	45.6	293.5	15.5
1959	52.0	313.8	16.6
1960**	51.2	321.1	16.0

*Total installment and noninstallment credit, all types.
**Total at end of March, 1960.

Consumer spending during the second quarter of this year was at a rate of $328.5 billion, or 27.9% greater than in 1955. About 13.5% of this was for durable goods, 47% for nondurable goods, and 39.5% for services. The rise in the cost of services has been at a much faster rate than for durable or nondurable goods, due in large part to the rapid increase in direct labor costs. Consumers have been buying more on credit, but the ratio of credit to spending has remained relatively stable.

over to new models, and will soon be producing at near capacity.

Personal income, retail sales and consumer spending have remained at record levels. Now, in this presidential election year, both political parties are committed to increases in government spending at the national level, while state and local government spending continues to increase rapidly, as it has over the past few years. Building construction, which has been running at slightly more than 10% of the economy for the last eight to ten years, is expected to hold its present rate during the balance of this year, and to turn upward slightly again in 1961. A stabilization, and possibly an uptrend, in the national economy therefore seems assured.

The nation's total volume of business is comprised of the volume of consumer spending, the volume of business (capital) expenditures, the volume of government spending, and the net balance of exports above imports. All of these factors are expanding, or at least holding at a record high.

Capital spending in 1960 is expected to total 13.2% more than in 1959, based on recent estimates.

Government spending — federal, state, local—continues its mounting burden on the taxpayers. Thirty years ago government spending was 10.8% of GNP; 20 years ago it was 20.8% of GNP; last year (1959) it was 27.5%, or over one-fourth of our total economic activity. The nation seems headed for a government spending colossus of about 40% of GNP by 1970, if the past trends are not halted.

THE ELECTRICAL INDUSTRY

THE nation's economic health and growth patterns affect the health and growth of the electrical industry, as it does all industries, both directly and indirectly. As pointed out on the preceding pages, the national economy will most likely experience slower growth over the next several months, probably through 1961. But it will also reflect greater stability for the same reason. Thus, it is logical to conclude that growth in the electrical industry will be slower than the normal growth rate, but this growth will occur with stability.

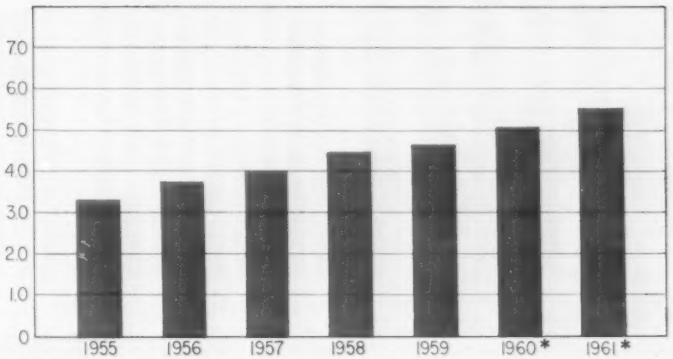
The optimistic outlook of eight months ago for the electrical industry during 1960 has changed, and many of the predictions have not materialized. New construction activity, over-all has actually declined slightly, and homebuilding fell short of earlier predictions. In the economy as a whole, the final demand for goods and services—food, cars, appliances, homes, capital goods, even defense spending—was not as great as was predicted last January. The small boom that was forecast did not occur. Instead, the economy has moved along on a high plateau, showing slight growth over-all, but with some industries—such as steel, autos, housing—experiencing declines.

What has happened in the national economy has contributed to its current strength and stability. Demand for goods and services has expanded, though slowly, and has helped to smooth out production following the steel strike, so that currently production is more sensitive to demand than would have been the case if we had experienced the excesses of a boom. Thus, the likelihood of continued prosperity through 1961 has been greatly enhanced.

Presented in this report are a number of charts and tables covering both national economy factors, and electrical industry statistics and market data. All tables and data are designed to provide up-to-date information for short-range planning, or for planning through 1961. Thus the actual data are shown on an annual basis for each year from 1955 through 1959, and estimated for 1960. In some tables, forecasts are also projected for the year 1961. Data for 1959, and for 1960 to the extent that it was available, have also been shown on either a quarterly, or monthly, basis. Thus, it should be easy for readers to estimate trends through the next 16 months, as specifically needed for individual requirements.

ELECTRICAL WORK IN CONSTRUCTION

(Billions of Dollars)



*Estimate, as of mid-1960

1960 ELECTRICAL CONSTRUCTION

(Millions of dollars)

Type of Construction	Volume*
Private Funds	
Residential	860
Industrial	460
Commercial and Institutional	1,019
Utilities	396
Farms	89
Other	8
Total Private	**2,832**
Public Funds	
Residential	32
Industrial	67
Educational	385
Institutional	201
Military	41
Highway and Conservation	318
Other	18
Total Public	**1,062**
Total for New Construction	3,894
Total for Modernization and Repair	1,200
Total Electrical Construction Work	5,094

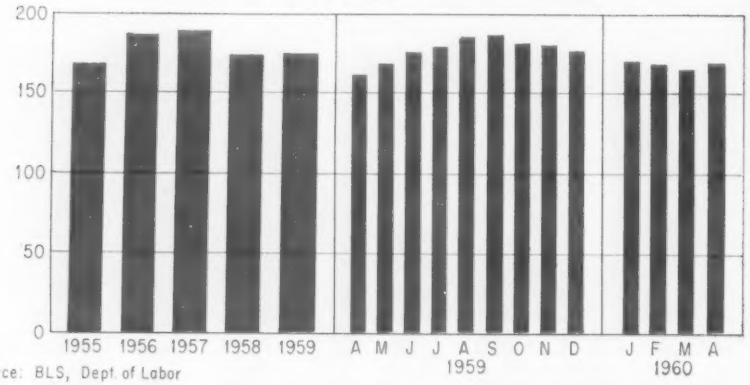
* EC&M estimate as of mid-1960.

Electrical Construction

The growth of electrical work in new construction and modernization from 1955 to 1958 was roughly 10% per year. This growth rate dropped to 5.2% in 1959, and is estimated to average about 7.7% this year over 1959. A growth rate of 8% is

ELECTRICAL WORKERS IN CONTRACT CONSTRUCTION

(Thousands of Workers)



Source: BLS, Dept. of Labor

Estimated average hourly union wage scale for electricians as of April 1, 1960, was $3.90, up 4.6% from April 1959, and ranged from $2.63 to $4.60 across the country. Average hourly earnings have increased 29.2% from 1955 to April of this year, or an average of about 5.25% per year.

predicted for 1961 (see actual dollar volume in chart on "Electrical Work in Construction").

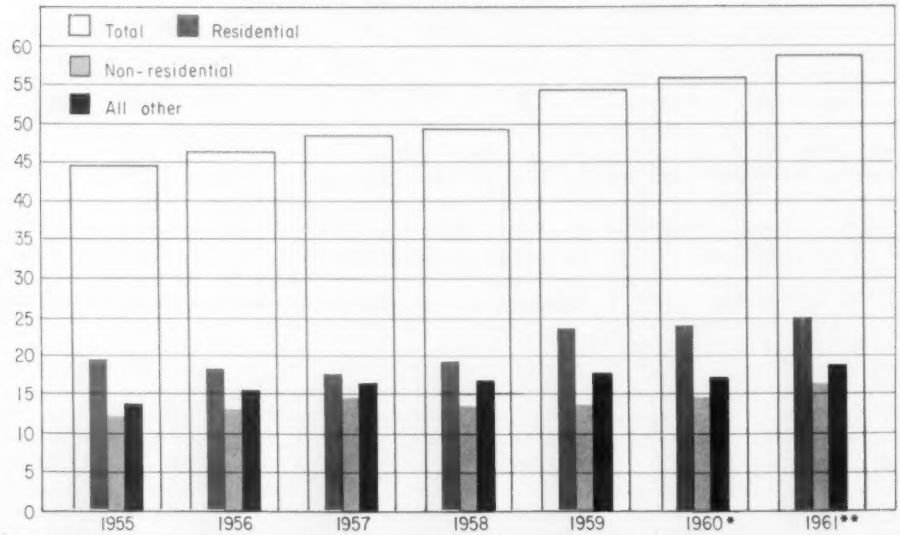
Part of the reason for the change in the rate of growth is due to the change in the "mix" of the type of electrical construction work involved. For example, electrical work in residential construction in 1960 (see table, "1960 Electrical Construction") totals $892 million, out of the total of $3,894 million for total new construction. This is 23% of the dollar volume of new electrical construction work, but residential construction dollar volume (see table, "New Construction") is 42.3% of the total new construction dollar volume. In other words, the percentage of the construction dollar in residential construction that goes into electrical construction work is relatively low.

In the classification of "nonresidential new construction," which carries an estimate of $14,625 million for 1960, or 23.5% of total new construction, electrical work is estimated at $2,132 million, which is 54.7% of the total electrical construction dollar volume of $3,894 million for new construction. Thus, sizable variations in the "mix" of new construction, between "residential" and "nonresidential," can result in even greater variations in the annual dollar volume of electrical construction work.

The number of electrical workers in contract construction in 1959 averaged 174,000, according to the Bureau of Labor Statistics. The

NEW CONSTRUCTION

(Billions of Dollars — Current Prices)



*Includes Alaska and Hawaii, and revised data on residential construction (BDSA mid-1960 estimate)
**EC&M estimate, as of mid-1960. Source: Depts. of Commerce and Labor

ELECTRICAL WORKERS' HOURS AND EARNINGS

Year	Average Weekly Hours	Average Weekly Earnings	Average Hourly Earnings
1955	39.1	$116.52	$2.98
1956	39.5	125.22	3.17
1957	39.2	132.10	3.37
1958	38.3	135.97	3.55
1959	38.4	142.08	3.70
Month			
1959—March	38.3	138.65	3.62
June	39.0	143.91	3.69
Sept	37.0	138.75	3.75
Dec	39.1	148.19	3.79
1960—March	38.0	146.30	3.85

Source: BLS, Dept. of Labor.

total dollar volume of electrical construction work in new construction in 1959 was $3,497 million, or roughly $20,000 of work per electrical worker. Since the average annual earning per electrical employee (see "Electrical Workers' Hours and Earnings") was approximately $7,428, 37.2% of the gross dollar volume of work per employee went for wages. The remaining $12,572 gross volume per employee went for material, overhead and profit.

Electrical workers' hours worked per week, on an annual average basis, peaked in 1956 at 39.5 hours. The average for last year, 1959, was 38.4 hours. In March of this year, the average weekly hours worked was 38.0, due in part to severe weather, and possibly in part

NEW CONSTRUCTION OUTLOOK FOR 1960

(Millions of Dollars)

TYPE OF CONSTRUCTION	Dollar Value Actual 1959	Dollar Value Estimate* 1960	% Change 1959/1960
TOTAL NEW CONSTRUCTION	**$56,033**	**$55,825**	**
PRIVATE CONSTRUCTION	**39,848**	**39,825**	**
Residential buildings (nonfarm)	24,469	22,925	−6
New dwellings units	19,233	17,400	−10
Additions and alterations	4,468	4,600	+3
Nonhousekeeping	768	925	+20
Nonresidential buildings (nonfarm)	8,859	10,075	+14
Industrial	2,106	2,700	+28
Commercial	3,930	4,200	+7
Office buildings and warehouses	1,954	2,100	+7
Stores, restaurants and garages	1,976	2,100	+6
Other nonresidential buildings	2,823	3,175	+12
Religious	947	1,025	+8
Educational	525	575	+10
Hospital and institutional	570	575	+1
Social and recreational	550	700	+27
Miscellaneous	231	300	+30
Farm construction	1,261	1,150	−9
Public utilities	5,052	5,375	+6
Railroad	251	300	+20
Telephone and telegraph	952	1,125	+18
Electric light and power	2,072	1,925	−7
Gas	1,657	1,925	+16
Other public utilities	120	100	−17
All other private	207	300	+45
PUBLIC CONSTRUCTION	**16,185**	**16,000**	−1
Residential buildings	962	825	−14
Nonresidential buildings	4,502	4,550	+1
Industrial	360	400	+11
Educational	2,656	2,650	**
Hospital and institutional	428	400	−7
Administrative and service	564	575	+2
Other nonresidential buildings	494	525	+6
Military facilities	1,459	1,225	−16
Highways	5,888	5,800	−1
Sewer and water systems	1,467	1,525	+4
Sewer	906	900	−1
Water	561	625	+11
Public service enterprises	551	650	+18
Conservation and development	1,127	1,200	+6
All other public	229	225	−2

* Mid-year 1960 estimate.
** Change of less than ½ percent.
Source: Construction Industry Division, BDSA, Dept. of Commerce.

BACKLOG OF PROPOSED ENGINEERING CONSTRUCTION

(Thousands of Dollars)

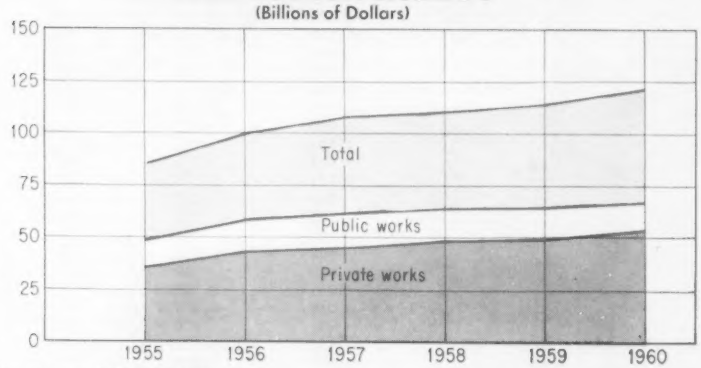
Private Projects

Type of Construction	Backlog*	% of Total
Bridges	98,436	0.1
Industrial buildings	17,713,304	14.4
Commercial buildings	26,620,720	21.7
Unclassified	10,548,533	8.6
Total Private Projects	54,980,993	44.8
Public Works Projects		
Waterworks	2,891,184	2.4
Sewerage	3,891,788	3.2
Bridges	3,345,123	2.7
Earthwork, irrigation, drainage	11,853,664	9.7
Streets and roads	13,720,450	11.2
Buildings	22,141,981	18.0
Unclassed	9,852,701	8.0
***Total Public Works Projects**	**67,696,891**	**55.2**
Total Backlog (Private and Public)	**122,677,884**	**100.0**
Federal Government work, included in Public Works Projects	**14,060,130**	**11.5**

* For United States, including Alaska and Hawaii, as of June 30, 1960.
Source: Engineering News-Record.

GROWTH OF PROPOSED ENGINEERING CONSTRUCTION BACKLOG*

(Billions of Dollars)



*As of June 30th each year
Source: Engineering News-Record

The backlog of proposed engineering construction has increased 44% since mid-1955. During this same period, total new construction has climbed from $44.6 billion in 1955, to an annual rate of $55.8 billion in June of this year, or 25%. The backlog is climbing faster than actual work is being done.

due to a slight slowdown in construction.

Wages for electrical workers, on both an hourly and a weekly basis, have climbed consistently since 1955, and are currently at an all-time high (see table "Electrical Workers' Hours and Earnings").

Building Construction

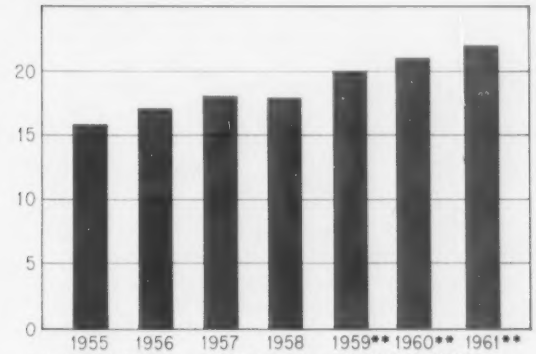
New construction dollar volume has declined slightly during the earlier months of this year, on a year-to-year basis. However, at mid-year, Dept. of Commerce forecast that for 1960 as a whole, expenditures should total about $55.8 billion, or nearly the same as in record-breaking 1959. The forecast indicates that despite a weakness in private housing, outlays for private construction should total $39.8 billion, maintaining the 1959 level, which was 14% above 1958. Public construction expenditures rose only 4% in 1959, and will not show a significant change between 1959 and this year.

Over the past ten years, new construction dollar volume has averaged in excess of 10% of the total economy (10% of GNP, in current prices). Actually, in 1955 new construction was 11.2% of GNP, and in 1959 it was 11.3%. In 1960 it will probably run about 11%, overall, down slightly due to the slowing down of construction this year.

Over the decade of the Sixties, it is still the opinion of most new construction analysts that construction activity will continue its upward trend. A year ago *Electrical Construction and Maintenance* forecast a $72 billion new construction volume by 1970. (EC&M, Sept., 1959, page 78). The backlog of proposed engineering construction, as of June 30, 1960, stood at a new high of $122.7 billion, as reported by *Engineering News-Record*, a McGraw-Hill publication. This is up from $114.1 billion a year earlier. Also, the F. W. Dodge Corporation predicted in the August 1960 issue of *Architectural Record*, a 77.6 billion dollar volume of new construction for 1969, measured in constant (1959) dollars, and a total market of $650 billion in new construction goods and services for the decade as a whole.

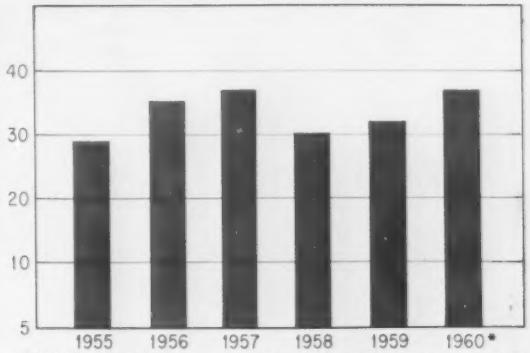
A major factor in the new construction activity will continue to be residential building (new dwellings, additions and alterations, and nonhousekeeping units). In 1960, residential construction is estimated at 42.3% of the total, with a total volume of $23,750 million. Under the Census Bureau's revised (1960) series for annual housing starts, total nonfarm starts in 1959 were 1,550,900. Future housing needs, based on population growth, new household formations, slum clearance, replacement, increased vacancies, etc., may raise the annual needs by the end of the decade to some 1,750,000 or more units, at an annual cost of about $34 billion. These new homes will require a higher

CONSTRUCTION MAINTENANCE AND REPAIR (Billions of Dollars)*



* In current dollars **Estimated by EC&M (mid-1960)
Source: Depts. of Commerce and Labor.

BUSINESS SPENDING ON NEW PLANT AND EQUIPMENT (Billions of Dollars)



* Anticipated by business. Source: Dept. of Commerce, and Securities and Exchange Commission.

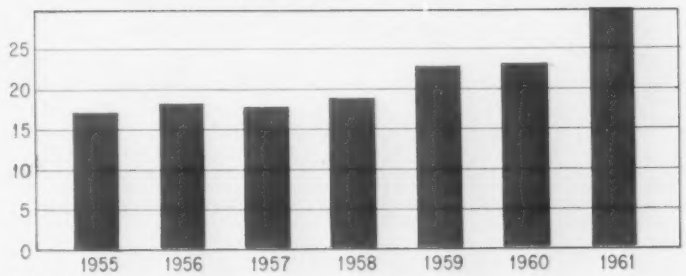
percentage of electrical work as living standards, and greater use of electric power increase.

Industrial construction, which peaked at $3.6 billion in 1957, is expected to total only about $3.1 billion this year—$2.7 billion in private expenditures, and $0.4 billion with public funds. According to a recent study by the McGraw-Hill Department of Economics, industrial construction volume for the next ten years will total about $45 billion, or an average of $4.5 billion annually (in 1960 dollars). The average for the past ten years has been $2.7 billion annually. Thus, industrial construction is expected to be two-thirds greater in the coming decade than in the past ten years. Some of the key forces which will bring about this upsurge in industrial construction include new products, new trends in transportation and in natural resource usage, changes in the labor force and in income levels, a shift in the geographic distribution of new industrial buildings, a greater emphasis on the construction of moderate-size plants, and a greater emphasis on aesthetics in plant design. Inherent in this industrial plant expansion will be an expanding market for electrical construction work. This type of construction already carries a sizable percentage of total construction dollar volume for electrical work, and this percentage may also be expected to increase by from 50% to 75% over the next decade.

Capital spending for new plant and equipment (see chart) picked

RESIDENTIAL CONSTRUCTION DOLLAR VOLUME

(Billions of Dollars)



EC&M estimate, mid-1960

ANNUAL HOUSING STARTS

Year	Former Series Nonfarm Starts	New Series* Nonfarm Starts	Total Starts
1955	1,328,900		
1956	1,118,100		
1957	1,041,900		
1958	1,209,400		
1959	1,378,500	1,530,900	1,553,100
Quarterly			
1959—1st	302,500	326,600	329,800
2nd	415,900	460,600	465,200
3rd	328,400	424,700	432,000
4th	281,700	319,000	326,100
1960—1st	250,600	261,100	267,500

* New statistical series, by Census Bureau, includes Alaska and Hawaii, and farm construction, plus improved data. Old series covered nonfarm starts alone.
Source: Bureau of Labor Statistics, Census Bureau, and Construction Division, Dept. of Commerce.

Number of dwelling units started annually has fluctuated fairly widely over the past five years. Also, the statistics have not been too reliable. The best post-War II housing year was 1950, when 1,396,000 dwelling units were started. The low point since 1950 was 1957, when total starts dropped to 1,041,000 units. Annual dollar volume for residential construction, on the other hand, has been more stable, has actually increased from year-to-year with the exception of 1957.

TWO DECADES OF INDUSTRIAL CONSTRUCTION

(Millions of Dollars)

Year	Private Expenditures	Public Expenditures	Total Volume
1950	1,062	224	1,286
1951	2,117	974	3,091
1952	2,320	1,684	4,004
1953	2,229	1,771	4,000
1954	2,030	1,506	3,536
1955	2,399	721	3,120
1956	3,084	453	3,537
1957	3,162	458	3,620
1958	2,382	408	2,790
1959	2,008	364	2,372
1950–59	22,793	8,563	31,356
1960*	**2,700**	**400**	**3,100**
1960-69**			**45,000**

* BDSA, Dept. of Commerce estimate, mid-1960.
** EC&M estimate, in 1960 dollars, mid-1960.
Source: Dept. of Commerce.

PRIVATE COMMERCIAL CONSTRUCTION

(Millions of Dollars)

Year	Office Buildings and Warehouses	Stores, Restaurants and Garages	Total Volume
1955	1,311	1,907	3,218
1956	1,684	1,947	3,631
1957	1,864	1,706	3,570
1958	2,013	1,576	3,589
1959	1,954	1,976	3,930
1960*	2,100	2,100	4,200

* Mid-1960 estimate, BDSA, Dept. of Commerce.
Source: Dept. of Commerce.

SCHOOL CONSTRUCTION

(Millions of Dollars)*

Year	Private	Public	Total
1946	123	101	324
1947	174	287	461
1948	253	618	871
1949	269	934	1,203
1950	294	1,133	1,427
1951	345	1,513	1,858
1952	351	1,619	1,970
1953	426	1,714	2,140
1954	529	2,134	2,663
1955	492	2,442	2,934
1956	536	2,549	3,085
1957	519	2,832	3,351
1958	574	2,875	3,449
1959	532	2,637	3,169
1960**	575	2,650	3,225

* Current Dollars.
** Mid-1960 estimate, by BDSA, Dept. of Commerce.
Source: Dept. of Commerce.

Three major sources for electrical work are industrial, commercial and school building construction. A volume of about $10.8 billion of construction in these three fields only is estimated for 1961, which should account for something in excess of one billion dollars of electrical work. During the coming decade, it is further estimated that industrial construction will increase at least 50% over the total for the past decade, to a total of about $45 billion.

up about 6.6% in 1959 over its low point of $30.5 billion in 1958, and in 1960 is expected to increase about 14% above the 1959 volume. A really strong factor in this growth, which may be expected to keep it growing, is technology—new knowledge, new techniques, new skills, new organizational schemes — backed up by expanding research and development, and new products of all types.

Another strong market for electrical construction work is private commercial construction, such as office buildings, warehouses, stores, restaurants, and garages. The growth of building construction in this area is shown in the table "Private Commercial Construction."

Private and public school construction spending has more than doubled during the last decade, and this has occurred without benefit of Federal financial aid. This market should continue its expansion during the next few years, at a growth rate equal to its growth rate over the past decade, either with or without Federal aid which is currently under discussion by Congress. Such expansion is more than ample to take care of the school construction needs for this period.

Electric Power Industry

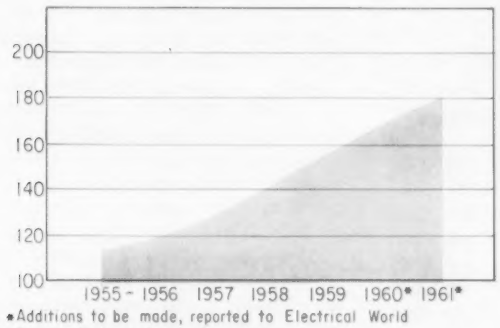
Electric power generating capability continues to expand. The electric utilities companies are currently adding about 12 million kw capacity to their lines annually. This is more than adequate to meet the existing growth demands of electric power production, expanding at an annual rate of about 8 to 9%, or about 55 billion kwhr per year in 1960.

The record of the sale of electric power, from 1955 to 1959, in dollars, in kwhr, and in number of customers, is shown in the table "Electric Energy Sales in U. S." Over this five-year period, dollar volume is up 31.8%; kwhr sales are up 30.3%; and number of customers is up 9.4%.

Revenues from residential electric service this year will total about $4.7 billion for 188.2 billion kwhr. Growth rates in the residential field are high, and are expected to expand still further under the impact of the Medallion Home industry promotion. This expansion will re-

ELECTRIC POWER GENERATING CAPACITY

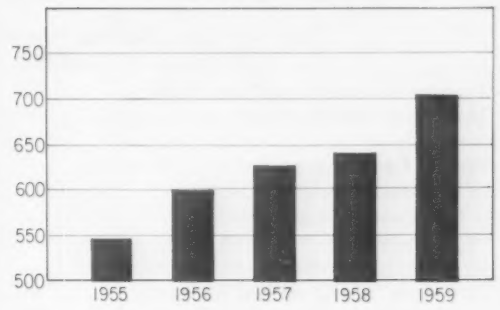
(In millions of kilowatts)



*Additions to be made, reported to Electrical World
Source: Federal Power Commission

ELECTRIC POWER PRODUCTION

(Billions of kwhr generated in U.S.)



Source: Electrical World

Production and distribution of electric power by the electric utilities companies are more than doubling each decade. This is a good barometer for electrical industry generally. Electrical World has forecast that by 1975, generating capability will reach 479 million kw, and energy sales will climb to about 2.1 trillion kwhr.

ELECTRIC ENERGY SALES IN U. S.

Year	Total Sales (Thousands of Dollars)	Total Sales (Millions of kwhr)	Total Ultimate Customers
1955	$8,020,439	480,921	52,558,601
1956	8,698,808	530,128	53,994,893
1957	9,289,602	557,829	55,171,089
1958	9,733,806	569,161	56,208,491
1959	10,572,652	626,743	57,504,761

Source: Edison Electric Institute.

USE AND COST OF ELECTRICAL ENERGY FOR RESIDENTIAL CUSTOMERS

Year	Annual Kwhr*	Total Annual Cost*	Annual Cost/kwhr*
1955	2,751	$72.63	2.64¢
1956	2,969	77.19	2.60
1957	3,174	81.25	2.56
1958	3,366	85.16	2.53
1959	3,585	89.63	2.50

* Averages.
Source: Edison Electric Institute.

flect in still more electrical construction work.

The Lighting Industry

An estimate of the dollar volume of lighting equipment being sold this year is given in the table on "1960 Lighting Equipment Dollar Volume." This table gives the estimated value of lighting equipment sold for each of the types of construction as listed and reported on monthly by the U. S. Census Bureau, Dept. of Commerce.

Previous forecasts on lighting equipment dollar-volume growth have indicated that the lighting industry more than doubles every ten years. These forecasts have shown actual dollar volume in 1950 at $289.7 million, in 1955 at $423.6 million, and the estimated volume for 1960, shown in this report, at $638.4 million. Previous forecasts for the future include 1965 at $1.0 billion, and 1970 at $1.4 billion. These forecasts are still valid.

Also shown in this report are the approximate sizes of a number of specialty lighting industries, based on their annual dollar volumes in 1959. These data have been obtained through independent market research studies on a one-time basis, and are presented here on that basis. The floodlighting data do not include residential, shopping center, or gasoline station lighting. The theatrical and movie lighting is based upon new school construction. And the swimming-pool lighting is based on the use of 142,000 units in 1959, and the statistic that 92% of all pools have some underwater lighting.

Research and development work in the electrical industry is at an all-time high, and growing. This work is in many fields, is expanding into still others, and is being carried out by both electrical and non-electrical manufacturing firms. Included in this research are such items as have been announced in recent months, as listed below.

1. *Power generators*—new types of power sources are under study and refinement, spurred on by the need for power for space vehicles. Five recent devices are: *solar cell*, which uses a semiconductor material to convert light into electricity; *thermoelectric couple*, which converts heat into electricity by means of two different types of semiconductors; *fuel cell*, which converts chemical energy into electricity; *thermionic tube*, which harnesses atomic energy, focused sunlight, or the hottest radioactive isotopes; and *magnetohydrodynamic gener-*

1960 LIGHTING EQUIPMENT DOLLAR VOLUME

(Used for General Lighting Purposes)*
(Thousands of Dollars)

Type of Construction Where Used	Value**
Total New Construction	$566,307
Private Construction	415,292
Residential (nonfarm)	111,040
Nonresidential building	284,524
Industrial	80,703
Offices, warehouses and loft buildings	68,250
Stores, restaurants and garages	75,600
Other nonresidential buildings	59,971
Religious	22,038
Educational	12,075
Hospital and institutional	10,350
Social and recreational	11,008
Miscellaneous	4,500
Farm construction	2,013
Public utilities	17,445
Telephone and telegraph	7,875
Other public utilities	9,570
All other private	270
Public Construction	151,015
Residential building	2,888
Nonresidential building	95,256
Industrial	8,160
Educational	59,731
Hospital and institutional	7,200
Administrative and service buildings	12,285
Other nonresidential building	7,880
Military facilities	5,111
Sewer and water systems	2,142
Public service enterprises	2,608
Conservation and development	960
Highways (includes street lighting)	41,600
All other public	450
Modernization	80,000
Total Lighting	638,367

* Does not include searchlights, automotive, aircraft or railway coach lighting, residential portable lamps, and similar types of lighting equipment not associated with building construction.
** EC&M estimate, mid-1960, based on Dept. of Commerce forecast for 1960 new construction at mid-year.

ator (MHD), which produces electricity by moving a conductor in a magnetic field—in which the "conductor" is a stream of hot (3000°C) gas that has been "seeded" with ions.

2. A remote-controlled electronic guard system, which utilizes all the wizardry of electronics—noise detectors, closed-circuit TV, sound wave generators.

3. Transistors and semiconductors—tiny chips of specially prepared germanium metal which offer new approaches to control and amplification of electrical signals. These devices were discovered more than a decade ago, but are now being adapted widely throughout the electrical industry.

4. New lighting developments: a) integrated lighting-heating-cooling systems; b) outdoor-type fluorescent lamps; c) new pencil-thin incandescent (Quartzline) lamps, with iodine added to the gas inside the bulb to prevent bulb blackening; d) new "peaking-ballast" dimming for fluorescent lamps; e) new transistor-type high-frequency inverters for fluorscent high-cycle lighting; f) more efficient electroluminescent lighting, including new colors; and g) a new "light-amplifier" device which uses a cube of synthetic ruby with peculiar optical properties, which reportedly makes possible the projection of a narrow light beam as intense as the sun.

These are only a few of the developments in the electrical field, which have already been announced and widely publicized. There are undoubtedly many, many more inventions and innovations under intense study and development at this time, some of which will be reported on in the months ahead and in the early 1960s. The impact of such research and development work will undoubtedly be great.

Electric Heating

The total dollar volume for shipments of all types of heating equipment for habitable structures in 1959 was $387 million, according to Building Materials Division, BDSA, Dept. of Commerce. Of this total, $27.8 million, or 7% of the total, was for electric heating equipment (see table, next page). The volume of other types of equipment was: gas—46%; oil—42%; and solid fuel—5%.

The market potential for the use of electricity as the heat-producing medium in all types of space heating equipment has long been recognized. Over the past ten to twelve years, many electric utilities companies and others have conducted studies on various methods of heating using electricity as the source of heat. More recently, the "Live Better Electrically," and the "Medallion Home" programs, which are devoted to the promotion of the all-electric home concept, have been sponsored by most of the electric utilities companies, and by electrical equipment manufacturers. These research and promotional efforts are producing results, as is indicated by these statistics.

Although the principal market for electric heat is in new-home construction, and in the rehabilitation of existing dwellings, it is also adaptable for use in commercial structures. Unit heaters are used

SPECIALTY LIGHTING INDUSTRIES

(Annual Dollar Volume, 1959)

Type of Lighting	Size of Industry ($000)
Industrial Safety	
Explosion Proof Luminaires	$4,000-$5,000
Dust Proof Luminaires	$300
Vapor Tight Luminaires	$5,000
Floodlighting Luminaires	$6,000*
Surgical Luminaries	$8,200
Dental Luminaires	$1,100
Theatrical	
Spot and floodlights	$5,000-$6,000
Movie Set Lighting	$1,000
Swimming Pool	
Underwater lighting	$4,600

* Does not include residence, shopping center, or gasoline service station lighting.
Source: Based on some independent studies.

mainly in commercial and industrial installations. Unit ventilators are primarily used in commercial and school construction.

Not included in the Dept. of Commerce data are heat pumps, which have been used on an increasing basis over the past decade. Some idea of the relationship between number of installations of resistance heating and heat pumps is provided by a survey last year, conducted by *Electrical World*, which indicated the number of installations which would be completed and in use as of December 31, 1959. This survey indicated that there would be a total of 613,250 resistance heating installations—579,000 in homes, and 34,250 in commercial and industrial buildings. It also indicated there would be a total of 78,900 heat pump installations—43,300 in homes and 35,600 in commercial and industrial structures.

The outlook is for continuing growth in the use of electric heating, spurred to new growth rates by lower and more attractive energy costs, technological advances in equipment, stepped-up market and sales promotion by utilities and equipment manufacturers.

The decade of the 1950's just closed, was a period of production growth, and expansion of facilities and capacities, in the electrical field as elsewhere. The decade of the 1960s, now getting under way, presents a challenge for market expansion, or the creation of new and larger markets to consume more of the products that can now be turned out at a faster rate and a lower cost. Over the next decade, the population gain will probably be on the order of 20%, and export markets should increase as living standards throughout the free world are improved. Research and development will account for many new products, and for spectacular improvements in existing products. Automation of production lines will help to reduce costs of these new and improved products. Strong market promotion can help to expand sales of these products. Thus, the outlook for the electrical industry is an optimistic one of continuing electrical progress.

ELECTRIC HEATING EQUIPMENT

(Value* of 1959 Shipments)

Type of Equipment	Output Btu/hr (000)	Total Value* (Dollars)	Percent of Total (Dollar Value)
Baseboard (not including glass panels)	9,571,986	$8,325,587	29.9
Convectors:			
Without fan	1,618,280	5,596,254	20.1
With fan	1,138,839	4,250,219	15.3
Glass panels:			
Baseboard	590,819	660,936	2.4
Radiant	234,101	1,432,897	5.1
Unit heaters and unit ventilators	666,601	5,654,322	20.3
Warm air furnaces:			
Central	54,660	88,828	0.3
Floor	21,807	51,701	0.2
Wall	66,760	210,522	0.8
Cable systems fabricated as:			
Units	589,239	1,095,607	3.9
Cable only	85,520	467,421	1.7
Total	14,638,612	$27,834,294	100.0

* At manufacturers' selling prices.
Source: Building Materials Div., BDSA, Dept. of Commerce.

Let's get realistic about . . .

Voltage Drop in

Design limitation of voltage drop in circuits can add substantially in increased copper, raceway and labor costs of the overall system. For this reason, permissible voltage drops in any system should be realistically related to the voltage characteristics of load devices supplied. Here's a close look at voltage drop in terms of efficiency vs economics for apartment-house wiring.

By Frederick Latzer, *Consulting Engineer, New York, N. Y.*

VOLTAGE drop as an engineering consideration in design of electrical wiring systems has been a subject of much study through the years. An almost endless stream of literature has told how to calculate voltage drop for this, that or the other system of supply—in magnetic or non-magnetic raceways—for different power factors—for circuits of all conceivable lengths. The subject has been treated in charts, tables, slide rules and assorted calculator devices. Short and long do-it-yourself formulas can be found in textbooks and handbooks, prepared by professional associations, by manufacturers and by various individual authorities. But on the subject of *voltage drop in apartment houses*, there is woefully little information available to the electrical construction industry. To stimulate development of such information, this article explores the subject in detail.

Present standards on voltage drop are contained in our codes, and one cannot but wonder why these standards have not been reviewed in the light of modern electrical needs. For instance, the allowable voltage drop in power feeders is generally set at 3%. The National Electrical Code, Sec. 215-3, sets forth 3%, although this is only a recommendation and is not mandatory. And the Chicago electrical code, as another example, says, "Good engineering practice requires that total voltage drop in power circuits to motors be held to a maximum of 5%, with 2% allocated to the branch circuit" (i.e., 3% in the feeder).

The allowable drop in lighting feeders is generally set at 1%. The N. E. Code advises that feeder drop be "not more than 1% for lighting and for combined lighting, heating and power loads." The Chicago code further states, "Because of the more critical situation on lighting and heating circuits, with a 100% steady load, a total of 2% drop is recommended, with 1% allocated to branch circuits" — which leaves 1% drop for the feeder.

Minimum voltage levels throughout electrical systems are of great concern to the system designer. In many cases, voltage tolerances can be most critical. And it is proper and necessary that our codes set the low limits of voltage levels as a precautionary safeguard in a competitive industry. But the problem should be treated realistically—in terms of today's systems, loads and electrical needs.

To arrive at some practical figures on optimum voltages we first must establish basic voltage conditions for apartment houses:

Service Voltage—We can safely take this to be nominally 120 volts. Over 80% of the supply systems of the country have apparently standardized on this figure; and for the large apartment house projects we are discussing, the percentage is probably nearer 100%. *Nominal* 120 volts does not of course mean an actual 120 volts at all times. Probably 117 volts at peak loads and 123 volts at minimum loads would be more realistic. Therefore, since voltage drop on feeders should be computed at peak loads, let us take the lower service voltage to be considered in our study as 117 volts. But let us not overlook the higher voltage of 123—this may be more important than the low limit.

Device Voltages—For purposes of this discussion, utilization devices affected by voltage application limits fall into the general categories of: lighting, heating, motor-driven, and electronic. We shall discuss the voltage operating limits of each, in turn. To ascertain what these limits should be, we contacted a number of the leading manufacturers of the last three types, requesting information on the nominal nameplate voltage rating and the lower and upper recommended operating limits. The voltage figures hereinafter used represent the consensus of the information obtained.

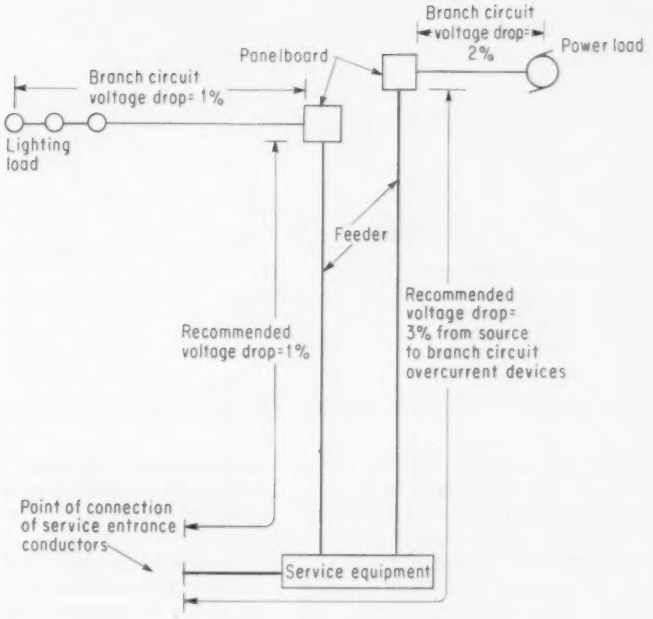
Lighting—Incandescent, fluorescent, mercury-vapor and other gas-

Apartment Houses

eous-discharge lamps are considered. Of these only the first can be said to be sensitive to voltage variation, since the lumen output drops appreciably with drop in voltage and lamp life is seriously affected by a rise in voltage. On the other hand, fluorescent and mercury lamps are relatively immune to moderate changes in voltage. For instance, on a 120-volt nominal base, fluorescent lamps will satisfactorily operate and ballasts are designed for a 110-125-volt range. Mercury-lamp transformers have taps for 105/118 volts—make your own choice.

Practically then, to arrive at some minimal value of desirable lighting voltage at the using point, we can confine our probing to the incandescent lamp. This is where our modern-condition consideration first materializes—for it must be said that, except in residential use, the filament lamp has definitely been relegated to secondary importance. Let us, therefore, talk about the one place where voltage drop should definitely be limited and where it probably would be greatest — the large apartment house, where the distance between the utility's supply point and the furthest lamp of a tenant can well reach 300-400 ft.

Lumen drop is the criteria, but where is this critical? In the kitchen or bathroom? No; these are most likely fluorescent. Halls, closets, bedrooms? No again; essentially these are secondary-use spaces, lightingwise. Dining room? Almost as extinct as the dodo; very limited use at the best, certainly not critical from a lighting standpoint. This leaves us the living room, and here light quantity is a must—or is it? Can any light source be more wasteful of lumens than are madam's ideas of decoration? And if she is short of lumens with a 60-watt lamp, how about using a 75 or, for that matter, a 150? All things considered, no gray hairs on this score seem warranted. Certainly a copper mine should not be installed in the building to give her a few more lumens, (so she can have more opaque shades on her lamps). Seriously, what should be the voltage at the lamp outlet, assuming the use of a 120-volt lamp?



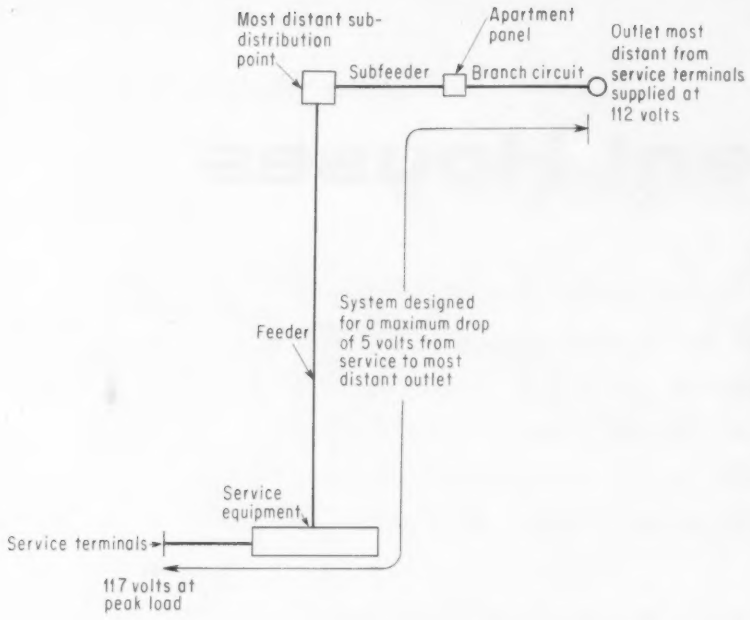
TRADITIONAL RECOMMENDATIONS ON VOLTAGE DROP

If we assume 112 volts as the socket voltage, we have a drop of 8 volts (on the 120-volt base), or 6.66%, and a lumen loss of only about 11%. Let us therefore tentatively use 112 volts as the acceptable socket voltage for lighting. This will permit a drop of (117-112 or) 5 volts in the wiring system at the assumed peak voltage. If any eyebrows are raised comparing this to the 1.2 volts (i.e., 1%), present thinking, so much the better.

Heating Devices — In commercial, institutional and industrial buildings these are normally of little importance or, contrariwise, of major importance. But if critical voltage-drop conditions arise in specific instances, this becomes a problem with which the designer can well cope. In any event, no safety considerations, only matters of time or efficiency, are involved.

In residential (apartment) buildings, however, the story is different. Heating devices (irons, toasters, ranges, dryers, etc.) become more important every day. But low voltage, within reasonable limits, results only in stretching the time of performance. This can become an unmitigated nuisance, but hardly a matter for code safety concern. However, let us examine the situation: what are the low limits?

First, it should be borne in mind that heating devices are nameplate rated 115 volts, not 120. Suppose we now assume an end voltage of 112, as for lighting; resulting wattage is as the square of the voltage, i.e.,


Most distant sub-distribution point
Apartment panel
Outlet most distant from service terminals supplied at 112 volts
Subfeeder
Branch circuit
System designed for a maximum drop of 5 volts from service to most distant outlet
Feeder
Service equipment
Service terminals
117 volts at peak load

REALISTIC VOLTAGE DROP PLAN FOR APARTMENT HOUSES

$(112/115)^2$ or 95% of the rated heat output. One must, in all seriousness, ask—so what? Raising our voltage means copper and that means money—usable to much better advantage for other enlargements of the electrical system. So let's tentatively establish 112 volts as the socket criteria for heating devices also.

Motor Driven Devices — These are critical to low-voltage conditions, both from a safety and use standpoint. How long can we go and still stay within bounds. Let us therefore consider the apartment house with its multiplicity of small motor-driven devices, (refrigerators, washers, air conditioners, etc.). Again, all such devices are presently nameplate rated for 115 volts. Device manufacturers say that their motors will operate on 10% voltage variation both plus and minus i.e., 104 to 126 volts; but it would be questionable to even approach the low limits. We feel that 5% under-rating should not be exceeded, otherwise serious abuses may materialize.

Using 5% then, we find the minimum operating voltage can be 115-(115 x .05) = 109.25 (let's say 110). On the 120-volt nominal supply basis, we can then afford 10/120 loss, i.e., an 8.3% drop, service to motor. However, if we keep to the 112-volt limit discussed for the previous devices, we have a safety margin of 8 volts and have only 8/120 or 6.7% drop. So far, so good.

Electronic Devices — Commercial and industrial use calls for specific study of each case; this we can safely leave to the designer. But in apartment use, television, specifically, is another matter (radio is not too critical). Voltage needs depend on many factors, such as make and age of set, for instance. Nothing here is accurately predictable, but we can establish some criteria based on television experience.

Authorities in the television field tell us that sets are nameplate rated at 115 to 117 volts, but that low-voltage limits should not be below 112 volts, although the better grade sets can tolerate 108 volts. So we're right back to our 112-volt thinking —for the howls of anger from the family whose picture is distorted, shrunk or unstable, is something a landlord cannot abide, no matter how thick his hide. And if he can pass this hot potato on to his engineer or contractor, or both, their lot is not to be envied. So, in self-protection, 112-volt minimum it is; and we're back to the permissible drop as for lighting, i.e., 5 volts.

Having established 5 volts as the maximum allowable drop on a 120-volt nominal supply, let us now consider a specific example of what this means in a fair-sized apartment project, supplied with the almost universal 120/208-volt, 3-phase, 4-wire system. We will take a project typical of the conditions we want to study—a 15-story, moderate rental ($40 to $60 per month per room, if one can forgive calling this moderate) building with ten 4½-room apartments per floor, each apartment modernly equipped. Demand loads are established on the 1959 NEC basis—i.e., 3 watts per sq ft for lighting, 3000-watt appliance load, a dishwasher, one 1½-hp air conditioner unit for the living room, two ¾-hp (7.5 amp units), for the bedrooms. There is no electric cooking, no clothes washers or dryers.

Apartment Unit Load

1. Lighting—1000 sq ft @ 3 watts = 3.0 kw
2. Appliance load 3.0 kw

6.0 kw

3. Apply demand factor
   3.0 × 100% = 3.0
   3.0 × 35% = 1.0
   Net lighting and appliance load 4.0 kw
4. Add at 100% demand:
   One dishwasher (fixed appliance) 1.5 kw
   One 1½-hp air conditioner (10,000 Btu) 1.8 kw
   Two ¾-hp air conditioners (6,500 Btu) 2.0 kw

   Total load after demand 9.3 kw
5. Amperes, 120/208-volt open Y (i.e., 3-wire) 38.8
6. Subfeeder size per phase leg No. 8

Feeder Load to One Meter Bank

Apartments are individually metered. Meters are located in centralized tenant floor meter closets, one such closet supplying three entire floors, i.e.,—30 apartments.

1. Lighting and appliance load, 30 apartments @ 6 kw = 180 kw
   Apply demand factor—
   3.0 @ 100% = 3.0
   117.0 @ 35% = 41.0
   60.0 @ 25% = 15.0

   Net load, lighting and appliance— 59.0 kw
2. Dishwashers—30 × 1.5 = 45 kw
   Apply demand factor of 75%, net load 34.0 kw
3. Air conditioner load, 30 × 3.8 kw at 100% = 114.0 kw
4. Total feeder load to one meter bank 207.0 kw
5. Amperes, 3-phase, 4-wire, 120/208 volts 575
6. Cable size—Two 300 MCM (RH, copper) per phase.

Service Feeder Load

Tenant's Load—150 Apartments:
1. Lighting and appliance load, 150 Apartments @ 6 kw = 900 kw

Apply demand factor,
120 kw @ 35% = 42 kw
780 kw @ 25% = 195 kw
Net lighting and appliance load 237 kw

2. Dishwashers 150 × 1.5 = 225 kw
Apply demand factor 25%
(see Note A) Net load, 56 kw

3. Air conditioner load
150 × 3.8 = 570 kw
Apply demand factor 75%
(see Note B) Net load, 427 kw

4. Total Net tenants' load 720 kw
5. Add owner's load—public lighting, elevators, boiler room, laundry, pumps, etc. 103 kw

6. Total Load on Service 823 kw
7. Amperes, 3-phase, 4-wire, 120/208 volts, 2280
8. Cable size—six 500 MCM (RH copper) per phase.

NOTE A—No warrant exists in the code for this demand factor. However, common sense dictates it is inconceivable that 75% of all dishwashers, i.e., 112 of them, would be operated at one time and long enough to exert a thermal effect on the cable. In fact, in this respect, NEC Table 220-8 for household dryers sets an example of realism and the figure of 25% is taken therefrom.

NOTE B—Again, no warrant exists for this demand factor. Certainly this is a demand which will approach the connected load. But we are considering here, a total of 3 × 150 = 450 units. Experience has demonstrated (in New York City, at any rate) that there is a use factor due to such considerations as families being away, units out of order, bedrooms not used, personal dislike of air conditioners, etc. We think our use of 75% is conservative. At any rate, this being a study of voltage drop and not of feeder design, we trust the reader will not be overly critical of this assumption.

Voltage Drops

In the preceding section we determined what cable sizes are required to satisfy adequate current carrying needs. We now study the problem of:

(I) What would our voltage drop be (to the final use point in the apartment), using the cable sizes determined above, i.e., thermal sizing only:

(II) What cables would we need for a total of 5 volts drop, service to use-point.

(III) What cables would we need for limiting the drop in the feeders to 1%.

To state the obvious, voltage drop calculation requires the need of establishing the following factors: cable sizes involved; distances, i.e., lengths of each circuit component; ampere loads in each circuit, and the power factor thereof; types of raceway employed, i.e., whether magnetic or non-magnetic; unit voltage drop factors to be used.

(1) Cable Sizes—limited in our example to No. 12, No. 8, 300 MCM and 500 MCM. All 600-volt rated; four individual wires per conduit, in feeders; three in subfeeders; two in branch circuits.

(2) Distances—The accompanying diagram of the feeder system for a 150-unit building is used to establish these typical distances:

Circuit A—Service feeder, as 100 ft.

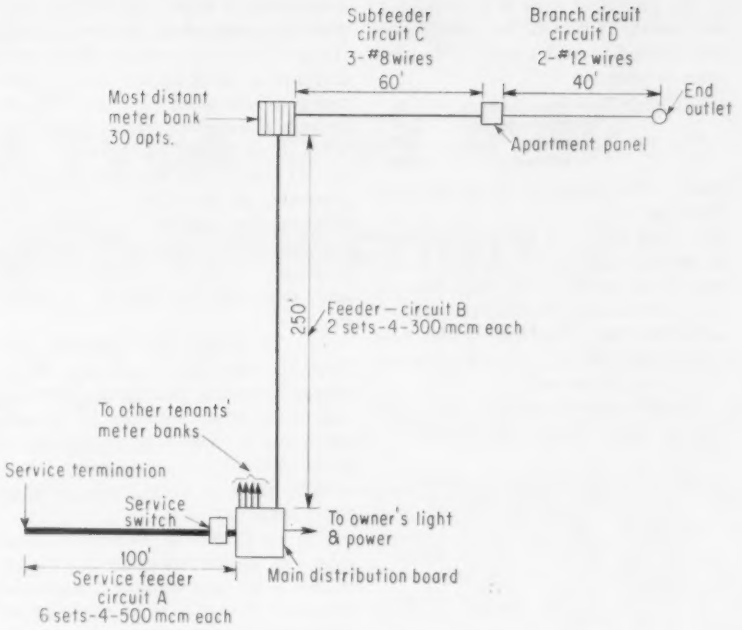
Circuit B — Feeder service switch to the furthest meter bank —250 ft.

Circuit C—Longest subfeeder from the meter to the individual apartment fuse cutout—60 ft.

Circuit D—The final branch circuit—40 ft.

We might here note that Circuit A will, more often than not, be much shorter, to the point of being zero. Our example purposely uses a garden type project, where the utility stops at the property line. But, the length of Circuit A might sometimes be 200 ft or longer.

(3) Ampere loads per wire then become as follows:



FEEDER SYSTEM FOR 150-UNIT APARTMENT HOUSE

Circuit A—2280 amps—6 wires per phase
= 380 amps
Circuit B—575 amps—2 wires per phase
= 238 amps (use 240).
Circuit C— = 39 amps (use 40).
Circuit D—Assumed as No. 12 wire and a 1200-watt load
= 10 amps

(4) Raceways—We will develop figures for both magnetic and non-magnetic types. Outside cables can well be direct-burial type or in fiber conduit. Inside, the use of aluminum conduit or aluminum armor is now a reality. These, of course, are all non-magnetic. In the magnetic, there is the old faithful—steel.

(5) Unit Voltage Drops—Here we tread on uncertain ground. Personally, we do not feel that firm factual data exists. But we have available a composite table, which tabulates 14 sources of drop data. The most widely used (though not the lowest), appears to be the data listed in the "Electrical Engineering Manual" of the International Association of Electrical Inspectors; this has been successfully applied in the New York area for some years. We believe it can be well used for our purposes. The data shown are for magnetic raceways, and are given in volts-drop-per-100 amps for 100 ft (10,000 amp ft). We will use the phase-to-neutral drop in each instance. Non-magnetic duct figures will be taken as 80% of the magnetic.

(6) Our next step is to establish the power factor to be considered and applied to each circuit. We propose to use:—

For Circuit D — branch circuit — 1.00
" " C — subfeeder — 0.98
" " B — feeder — 0.98
" " A — service feeder — 0.97

There will probably be some differences of opinion on these figures; but since, as far as we know, no factual data exist on this point and since much lower figures are not conceivable, the results cannot be far wrong. The IAEI tables run 1.0 pf and 0.90 pf; we will interpolate where necessary.

(7) We now establish our unit voltage drop from the IAEI tables:—

LINE TO NEUTRAL DROP—VOLTS PER 10,000 AMP FT

	No. 12 Wire 2-wire, 1-phase CIRCUIT D	No. 8 Wire 3-wire, open Y CIRCUIT C	300 MCM 4-wire, balanced Y CIRCUIT B	500 MCM CIRCUIT A
Magnetic Ducts				
1.0 pf	33.0			
0.98 pf		10.0	0.40	
0.97 pf				0.25
Non-magnetic Ducts				
0.98 pf			0.32	
0.97 pf				0.20

Note—No non-magnetic data used for Circuits D and C; these are invariably steel conduits.

(8) The multiplying factors needed to convert the 10,000-amp-ft findings in the above table to the actual volts drop of our specific circuits are as follows:—

Circuit D — 10 amps × 40 ft = 400-amp ft = $\frac{400}{10{,}000}$ = 0.04
Circuit C — 40 amp × 60 ft = 2,400-amp ft = 0.24
Circuit B — 240 amps × 250 ft = 60,000-amp ft = 6.00
Circuit A — 380 amps × 100 ft = 38,000-amp ft = 3.80

(9) Now we are ready for the actual voltage-drop figures for our building:—

Magnetic Ducts:	Drop	% of 120 Volts
Circuit D—33.0×0.04 =	1.32 volts	1.1
C—10.0×0.24 =	2.40 volts	2.0
B—0.40×6.00 =	2.40 volts	2.0
A—0.25×3.80 =	0.95 volts	0.75
TOTAL DROP	7.07	5.85%

Non-Magnetic Ducts:	Drop	% of 120 Volts
Circuit D—1.32 v×100% =	1.32 v	1.1
C—2.40 v×100% =	2.40 v	2.0
B—2.40 v× 80% =	1.92 v	1.6
A—0.95 v× 80% =	0.76 v	0.63
TOTAL DROP	6.40	5.33%

Bearing in mind that 5-volt drop was our maximum desired (from the assumed 117 volts at the supply end during peak load), we find that using cables sized for only the required current-carrying capacity, we cannot quite reach even that liberal limit. We further find that lowering the drop by the 1.40 volts still needed (using the favorable non-magnetic raceway) presents problems. Let us analyze where and how we can effect a lower drop:—

(a) In Circuit D?—Hardly. Increasing the wire size to No. 10 or larger presents practical construction difficulties, both electrical and mechanical, which all contractors will immediately recognize, and which, in any event can produce little benefit.

(b) In Circuit C?—Yes, at some cost. If we increase the wire size to No. 6 we can achieve a decrease of about 1 volt, but at the cost of the next larger size of conduit (1 in.), as well as the wire, and of course, labor. Considering that there are 150 of these circuits, all of which would be affected, an increased cost of some $1500 is indicated.

(c) In Circuit B?—Yes, also at some cost. To achieve the further ½-volt decrease needed, we would have to increase the cable to 400-MCM and the conduit from 3" to 3½". There are five of these risers in our building, but only about three would be affected. Total length of affected feeder would be 250 × 3 × two (parallel legs), or 1500 ft, which, at about $3.00 per foot, is $4500.

(d) In Circuit A—No. Any increase here would be enormously costly and hardly effective. If we increase Circuits B and C above shown, there will be no need to change Circuit A.

(e) We therefore conclude: even using the 5-volt limit (4.17% on 120-volt base) increased costs are likely to develop in relation to cost of thermal-sized conductors only.

1% Drop—The 1% drop figure as now used is generally limited to the "feeder" system; i.e., in our example Circuits A and B. The minimal drop found in the computation for non-magnetic raceway above, for these circuits, is 2.68 volts. The enormity of the problem of dropping this to 1.2 volts (i.e., 1%) is self evident and needs no elaboration. We must therefore consider this 1% criterion as impossible of achievement as well as, we believe, unnecessary.

General Conclusions

Let us now summarize the results of the above study; what do we find?

1. That, for all practical purposes, if we have 112 volts at the final socket we have a safe and practical working figure upon which voltage drops can be based.

2. That, under average conditions, if we allow for a 5-volt drop, service point to socket, we can be reasonably certain of getting the 112 volts even if the service voltage at peak loads drops to 117 volts, (from the nominal 120 volts). On the basis of percent drop, we can safely allow 4.5% figured on 120 volts.

3. That of the 4.5%, there should be allocated 1.0% as the drop in the branch circuit, (since the use of No. 12 wire is practical in all instances.)

4. That this leaves 3.5% as the allowable drop in the service, feeder and subfeeder runs.

5. That 3.5% drop is achievable in many instances without any increase in the sizes of cables based only on current-carrying capacity. This is probably achievable with very modest increases in cost in most other cases.

6. That the limitation of drop to 1% is impossible and unnecessary to achieve and tends to inhibit the expansion of our electrical systems. That such expansion is by no means confined to the uses we already take for granted (dishwashers, garbage disposals, clothes washers, air conditioners, television, etc.), is well illustrated by two new developments: (1) the advent of the 5-kw combination washer-dryer, with its small space needs, and (2) the use of electric space heating, already launched on apartment house scale, made competitively feasible by, strange as it may seem, the advent of air conditioning. Let us therefore place no more burden on our wiring costs than is necessary for safety and practicality of use. Our industry is no exception to the rules of economics—the lower the cost of your product, the easier the sale.

Over-Voltage

We search in vain through our technical literature for discussions

(Continued on page 241)

• *ESTIMATING FORUM—IV*

By Ray Ashley, *Research and Consulting Engineer, Oak Park, Ill.*

Project Type and Risk Affect Job Selection

STATEMENT:

Electrical contractor Jones regularly submitted bids to a certain architect, but had not been awarded a contract for a long time. Finally, the architect advised him that he was close to the low bid on two jobs and that he could have either one if he met the low figure.

The projects and bids were as follows:

No. 1—A Hospital Addition. Low bid was $27,750. Jones' bid was $28,320 or $570 high.

No. 2—An Industrial Project. Low bid was $25,750. Jones' bid was $26,600 or $850 high.

To the architect's surprise, contractor Jones selected the industrial project which required the biggest cut in his bid price and was, in effect, a smaller contract.

QUESTION:

Did Jones exercise good business judgment in his choice of the industrial project?

ANSWER:

Yes. The industrial project offered less risk; would be of shorter duration; had a better labor-material ratio.

DISCUSSION:

To implement the discussion, methods of estimating used by each contractor are shown. For simplicity, the same base cost was used for both contractors. The difference appears in the markups used and the method of applying them. Figs. 1 and 2 represent Jones' and the low bidders hospital estimates. Figs. 3 and 4 represent Jones' and the low bidder's industrial project estimates. Fig. 5 represents Jones' revised estimate to get the industrial job.

Job duration is an important consideration on any project. On an industrial job, start of the electrical work may be delayed by progress of the general contractor. Once started, chances of proceeding without further delay are very good. Throughout the life of a hospital job, progress of electrical work is governed by other trades. The work not only costs more, but job duration is much longer.

Dollarwise, these two projects are quite similar. For this industrial project, assume normal duration to be 16 weeks. The same payroll on a hospital job would very likely represent a duration twice as long. And remember, the hospital payroll (Figs. 1 and 2) was $10,800 compared to $8,000 (Figs. 3 and 4) for the industrial work.

Contracts for material involve less risk than do those for labor. This was an influencing factor in Jones' choice of projects. The material-labor ratio of the industrial job was substantially more inviting.

Under the pressure of estimating and bidding jobs, we are inclined to forego a thorough analysis of the work being figured. However, when given a chance to meet a low bid, we really go to work. That is what happened in Jones' case. While reviewing his estimates, Jones discovered he had used the same markups for both jobs. He then realized that the industrial

(Continued on page 210)

FIG. 1—JONES' HOSPITAL ESTIMATE

		MATERIAL		LABOR
Base costs (material purchase)		$10,500	Payroll	$10,800
Direct job expense (material)	2%	210		
Direct job expense (labor)	6%	648		
		$11,358		$10,800
Overhead	8%	909	30%	3,240
Complete job costs		$12,267		$14,040
Return	5%	613	10%	1,404
Sell price—Material		$12,880		$15,444
Sell price—Labor		15,444		
Sell price—The Job		$28,324		
Bid Price $28,320				

Luminous Dome Solves Glare Problem

Smith Electric Company of San Francisco designed and installed a unique skylight installation; using coupled fluorescent striplights, messenger-cable suspension, sliding relamping techniques and aluminum canopy in confined attic space where accessibility was difficult.

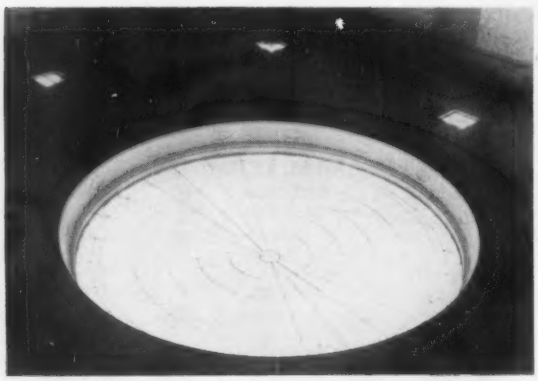
UNTIL a few months ago, anyone visiting the San Francisco headquarters of the California Pacific Title Insurance Company undoubtedly would have been annoyed at the extreme fluctuations in general illumination, for a 40-ft-dia shallow-domed central skylight would deliver as much as 700 footcandles to counters and desktops at high noon on sunny days, although clouds or fog in the late afternoon could cut this level to as little as 10 or 8 fc.

These wide variations were due to the fact that the frosted-glass skylight was surmounted by a second pyramid-shaped clear-glass exterior roof structure, a combination that translated daily and seasonal outdoor weather conditions into interior extremes of glare and gloom.

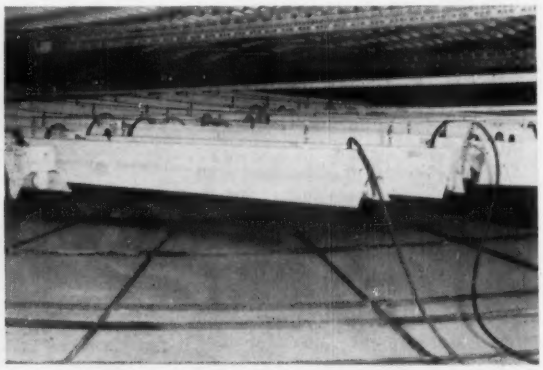
Between skylight and exterior glass roof, thirteen 500-watt floodlights had been installed in an endeavor to raise the lower limit of lighting intensity, but these lamps were too few in number to achieve their purpose. Spacing between fixtures was too great to obtain even illumination of the skylight's surface, and glass used for panelling the skylight was too dense to efficiently transmit artificial illumination to working areas located 28 ft beneath it.

For these several reasons, Title officials invited Warren G. Smith, president of Smith Electric, to study the problem and submit proposals for solving it. It was stipulated, however, that the overall architectural appearance of the ceiling would not be altered; the resulting lighting treatment would provide at least 50 footcandles of general illumination; relamping and maintenance would be accomplished from within the confined space above and around the domed skylight; and no scaffolding would be erected on the central office floor.

After investigation of local conditions and conferences with architects and consultants, Smith came up with a triple solution that reflects considerable ingenuity.



MID-DAY GLARE and afternoon gloom formerly created lighting variations to range from 700 to 8 footcandles beneath this 40-ft-diameter skylight. Replacement of dense glass dome panels, installation of sliding fluorescent fixtures and creation of aluminum canopy now provides even 50-fc intensity to desks and counters 28 ft below.



NEARLY 300 PANELS of various sizes and shapes were cut from Plexiglas and installed in original inverted-T skylight framework to replace glass sections which were too densely frosted to efficiently transmit artificial illumination provided by a few 500-watt incandescent floodlights.

First, to improve light transmission and diffusion characteristics, all inverted-T framing members of the skylight were left in their original positions, although the dense glass panels were replaced by sections of ⅛-in.-thick Plexiglas. Since there are 288 sections of various sizes and shapes, the removal of old panels, precision cutting of Plexiglas duplicates, and replacing these new sections in the original skylight frame was a delicate, tedious operation.

Second, to obtain even, high-level illumination to top-light the new skylight, it was decided to remove the original 13 incandescent fixtures and to install in their place a total of 188 rapid-start fluorescent lamps which would be mounted in continuous rows of various lengths. Distances between rows, and also between lamps and skylight surface, was to be approximately 20 in.

This decision proved to be simpler in theory than in actual attainment because, since maintenance and relamping had to be accomplished from the narrow crawlspace surrounding the central dome, the fluorescent strips could not be secured in fixed, inaccessible positions above the skylight.

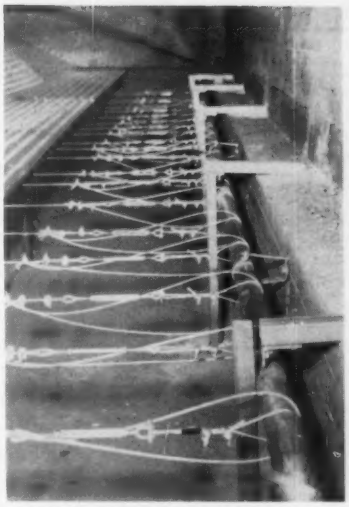
This problem was solved by installing 24 equally spaced rows of steel airplane-control cable (tested for 2000-lb stress) across the dome, securing the cables at either end by turnbuckles and clevis anchors attached to horizontal pipe racks which, in turn, were secured to adjacent parapet walls by lipped-channel brackets and pipe clamps.

Midpoints of cables were raised slightly by a central channel strong-back member suspended by rod hangers secured to exterior-roof purlins, a procedure that resulted in cables remaining approximately equidistant above the skylight for its full width. Anchoring of channel brackets and pipe clamps to the masonry parapet walls was accomplished by using powder-driven studs.

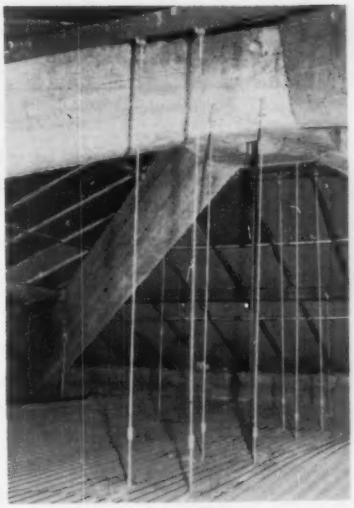
Fluorescent lamp chassis (including 4- and 2-ft lengths) were then equipped with snap-rings on top and end sections, thereby making it possible to couple the fixtures together in tandem, and to suspend them on the dome-spanning messenger cables. Ends of chassis were likewise equipped with short lengths of 3-conductor rubber-insulated connection cords and twist-lock plugs in order to couple the lampstrips electrically as well as mechanically.

With lampstrips so equipped, it was then possible to progressively snap fixtures to messenger cables, slide them out over the skylight, couple next-in-line chassis to them, and continue in this manner until all rows extended outwards to reach

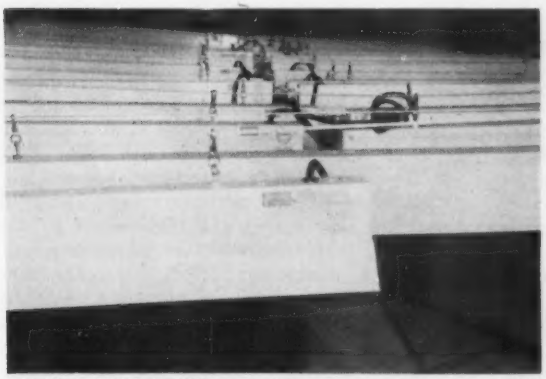
(Continued on page 242)



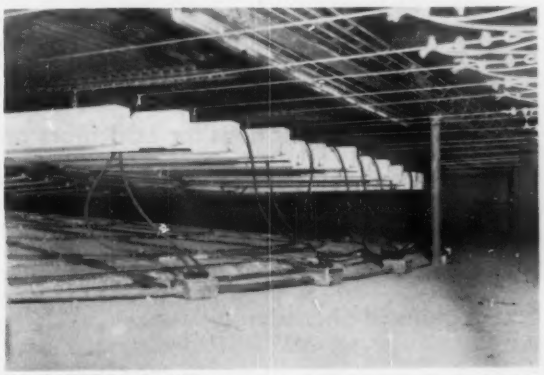
AIRPLANE CONTROL CABLES, used to support fluorescent lampstrips, are secured to terminal pipe racks by means of turnbuckles and clevis anchors. Pipes are secured to masonry parapet walls by means of lipped-channel brackets and pipe clamps; these anchoring mediums being fastened to concrete deck and parapets by powder-driven studs.



CORRUGATED ALUMINUM canopy is supported by rod hangers attached to purlins and hip beams of exterior roof. Hangers also continue through "umbrella" to support central strong-back which, in turn, lifts midpoints of cables slightly in order to maintain equidistant gap between lampstrips and shallow-domed skylight surface.

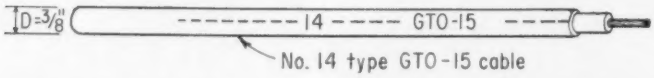


EVEN ILLUMINATION of skylight is now obtained from 188 rapid-start fluorescent lamps. Note snap-rings on tops and ends of fixtures to permit attachment to supporting messenger cables and coupling of chassis in tandem. Electrical connection of lampstrips is by means of short flexible leads and twist-lock plugs.



LAMPSTRIP CHASSIS at ends of rows are equipped with longer flexible leads and plugs that connect into duplex receptacle boxes positioned around the skylight rim. Connection of receptacles for circuiting purposes is via curved lengths of rigid conduit. Lighting installation represents electrical load of 9 kw.

Area of Odd-Sized Conductor



What size conduit would be required for two No. 14, 15-kv neon sign cables? The diameter of each cable is ⅜ in. (.375).

CSA = $D^2 \times .7854$

CSA = $(.375)^2 \times .7854$

CSA = .1104

Total cross-sectional area for both cables is $.1104 \times 2 = .2208$. According to the conduit percentage fill at the bottom of Table A, a 1-in. conduit would be required.

How to compute . . .

Conductor Fill In Raceways

With the 1959 NEC permitting more than nine conductors in conduits, the possibility of different sizes of conductors occupying the same raceway has been greatly increased. New tables are offered to simplify calculations for estimators and designers who must determine raceway sizes in combinations not shown in present NEC tables. Examples are given to explain the application of the tables, and a general discussion follows.

By J. H. Watt

ONE of the most significant changes incorporated in the 1959 NEC was the removal of the 9-wire restriction in conduits for general wiring. As a result of this revision, the number of conductors that may occupy a conduit is limited only to a maximum fill of 40% of the cross-sectional area of a given size conduit.

Table 1 of Chapter 9 (1959 NEC) gives the maximum number of conductors of equal sizes for each respective conduit size. And this table applies to new installations of conduits.

When installing different conductor sizes, the proper conduit size is computed according to NEC Tables 3 through 7, Chapter 9. And with a large number of different conductor sizes, this requires a considerable amount of arithmetic to arrive at the proper size conduit. Since most of these computations are made in the design stage, the tables in this article have been compiled to simplify the procedure. The advantage to these supplemental tables is that the only arithmetic involved is simple addition, plus moving a decimal point in some instances. Multiplying is eliminated, and with it, the chance of error so common in such problems.

Table A for New Work

Accompanying Table A applies to combinations of conductors not included in Table 1, Chapter 9 of the NEC. Conductor dimensions are those of Type RW conductors as given in Column 3 of NEC Table 5, Chapter 9. This is in accordance with the provisions of Section 346-6 (a-2), which specifies the use of rubber-covered conductor dimensions for new work as shown in Table 5, Chapter 9. And Table 5, Chapter 9 mentions the use of Type RW dimensions for No. 14 and 12 sizes, because Type R and RH conductors in these two sizes have smaller cross-sectional areas.

While accompanying Table A gives only the dimensions of the various conductor sizes up to a total of nine conductors, the figures may be used for any number by shifting decimal points one place to the right for each multiple of ten, and adding values for less than ten conductors.

As an example, assume that 27 No. 12, 14 No. 10, and 12 No. 6 conductors are to be installed in a conduit. The size of the conduit

TABLE A—Conductor and Conduit Area—Square Inches

Size AWG MCM	Combination of Conductors for New Work, Where Not Included in Table 1, Ch. 9, NEC For Size of Conduit or Tubing Required								
	1	2	3	4	5	6	7	8	9
18	.0167	.0334	.0501	.0668	.0835	.1002	.1169	.1336	.1503
16	.0196	.0392	.0588	.0784	.0980	.1176	.1372	.1568	.1764
14	.0327	.0654	.0981	.1308	.1635	.1962	.2289	.2616	.2943
12	.0384	.0768	.1152	.1536	.1920	.2304	.2688	.3072	.3456
10	.0460	.0920	.1380	.1840	.2300	.2760	.3220	.3680	.4140
8	.0760	.1520	.2280	.3040	.3800	.4560	.5320	.6080	.6840
6	.1238	.2476	.3714	.4952	.6190	.7428	.8666	.9904	1.1142
4	.1605	.3210	.4815	.6420	.8025	.9630	1.1235	1.2840	1.4445
3	.1817	.3634	.5451	.7268	.9085	1.0902	1.2719	1.4536	1.6353
2	.2067	.4134	.6201	.8268	1.0335	1.2402	1.4469	1.6536	1.8603
1	.2715	.5430	.8145	1.0860	1.3575	1.6290	1.9005	2.1720	2.4435
0	.3107	.6214	.9321	1.2428	1.5535	1.8642	2.1749	2.4856	2.7963
00	.3578	.7156	1.0734	1.4312	1.7890	2.1468	2.5046	2.8624	3.2202
000	.4151	.8302	1.2453	1.6604	2.0755	2.4906	2.9057	3.3208	3.7359
0000	.4840	.9680	1.4520	1.9360	2.4200	2.9040	3.3880	3.8702	4.3560
250	.5917	1.1834	1.7751	2.3668	2.9585	3.5502	4.1419	4.7336	5.3253
300	.6837	1.3674	2.0511	2.7348	3.4185	4.1022	4.7859	5.4696	6.1533
350	.7620	1.5240	2.2860	3.0480	3.8100	4.5720	5.3340	6.0960	6.8580
400	.8365	1.6730	2.5095	3.3460	4.1825	5.0190	5.8555	6.6920	7.5285
500	.9834	1.9668	2.9502	3.9336	4.9170	5.9004	6.8838	7.8672	8.8506
600	1.1940	2.3880	3.5820	4.7760	5.9700	7.1640	8.3580	9.5520	10.7460
700	1.3355	2.6710	4.0065	5.3420	6.6775	8.0130	9.3485	10.6840	.....
750	1.4082	2.8164	4.2246	5.6328	7.0410	8.4492	9.8574	11.2656	.....
800	1.4784	2.9568	4.4352	5.9136	7.3920	8.8704	10.3488	.....	.....
900	1.6173	3.2346	4.8519	6.4692	8.0865	9.7038	11.3211	.....	.....
1000	1.7531	3.5062	5.2593	7.0124	8.7655	10.5186	.....	.....	.....
1250	2.2062	4.4124	6.6186	8.8248	11.0310	.....	.....	.....	.....
1500	2.5475	5.0950	7.6425	10.1900	.....	.....	.....	.....	.....
1750	2.8895	5.7790	8.6685	11.5580	.....	.....	.....	.....	.....
2000	3.2079	6.4158	9.6237	.....	.....	.....	.....	.....	.....

% of Area	Use	½"	¾"	1"	1¼"	1½"	2"	2½"	3"	3½"	4"	5"	6"
31%	2 Cond.	.09	.16	.27	.47	.63	1.04	1.48	2.29	3.07	3.94	6.20	8.96
40%	4 or more	.12	.21	.34	.60	.82	1.34	1.92	2.95	3.96	5.09	8.00	11.56
43%	3 Cond.	.13	.23	.37	.65	.88	1.44	2.06	3.17	4.26	5.47	8.60	12.42
53%	1 Cond.	.16	.28	.46	.80	1.08	1.78	2.54	3.91	5.25	6.74	10.60	15.31

Note. For rewiring existing, concealed conduits, the conduit percentage fills at the bottom of Table C may be used.

is determined from accompanying Table A. If two No. 12's equal 0.0768, then for 20 No. 12's, move the decimal point one place to the right, which equals 0.7680. Then add to this figure 0.2688, which is given in the table for seven No. 12's. Thus, for 27 No. 12's, the total is 1.0368. Following the same method, 14 No. 10's are figured as follows:

10 No 10 = 0.4600 (decimal point moved one point to the right from single conductor figure)

4 No. 10 = 0.1840

14 No. 10 = 0.6440

And for 12 No. 6's:

10 No. 6 = 1.2380 (decimal point moved one point to the right from single conductor figure)

2 No. 6 = 0.2476

12 No. 6 = 1.4856

Adding the three sub totals,

27 No. 12 = 1.0368
14 No. 10 = 0.6440
12 No. 6 = 1.4856

Total sq. in. area = 3.1664

Referring to the 40% conduit fill figures at the bottom of Table A, a 3½-in. conduit would be required.

If an adding machine is close at hand, the total cross-sectional area of any combination of conductor sizes can be computed in less than a minute. But in using a standard adding machine, forget the decimal points that appear on the adding machine tape. In Table A, you will notice that four figures always appear to the right of the decimal point for each value. And with an adding machine, bear this in mind, For 20 No. 12 conductors, 7680 will appear on the adding machine tape, because 0.0768 for two No. 12's becomes 0.7680 for 20 No. 12's (decimal is moved one place to the right and a zero added at the end to maintain a 4-place decimal alignment). Here's how the previous example is tabulated on an adding machine tape for 27 No. 12, 14 No. 10, and 12 No. 6 conductors from the values given in Table A:

7680 (20 No. 12—0.7680)
2688 (7 No. 12—0.2688)
4600 (10 No. 10—0.4600)
1840 (4 No. 10—0.1840)
12380 (10 No. 6—1.2380)
2476 (2 No. 6—0.2476)

31664 Total

Now take the figure 31664 and count off four decimal places to the left. The result is 3.1664, which is the same as in the previous example, and represents the total cross-sectional area of the conductors under consideration.

Smaller combinations, such as three No. 10's and three No. 4's, can be computed simply by glancing at Table A. The value for three No. 4's is 0.48+, and for three No. 10's the value is 0.13+. Then the total is 0.61+. From the 40% conduit-fill figures at the bottom of Table A, a 1½-in. conduit would be required.

Rewiring Existing Conduits

As previously discussed, Table A applies to new conduit installations where, in general, conductor fill is limited to 40% of the interior cross-sectional area of a conduit. Such a limitation on an original installation simplifies the addition of more branch circuits or larger feeders where load requirements are increased in the future.

With this thought in mind, the NEC permits a greater percentage fill of conductors in an existing conduit in addition to allowing the use of actual conductor insulation dimensions in making computations. For rewiring existing raceways for increased load where it is impractical to increase the size of the raceway due to structural conditions, NEC Table 3, Chapter 9 permits three or more conductors to occupy 50% of the interior cross-sectional area of a conduit. For a single conductor, 60% fill is permitted, and two conductors may occupy a 40% fill. And to be consistent with an official interpretation issued a number of years ago, this increased percentage fill applies only to existing concealed conduits. Therefore, the calculations in the accompanying Tables B and C are intended for the rewiring of existing concealed conduits. If used for other than this, approval should be obtained from the code authority having jurisdiction.

TABLE B—Maximum Number of Small Diameter Conductors Permitted Where Rewiring Existing Concealed Conduits. Types T, TW, *RU, *RUH, **THW, ***R, and ***RH

Size AWG or MCM	Maximum Number of Conductors in Conduit or Tubing											
	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6
18	17	30	48	85	115	190						
16	13	24	39	68	93	154						
14	11	19	31	55	75	124	177					
12	8	15	25	43	59	97	139	214				
10	6	11	19	33	45	75	106	164	220			
8	3	6	10	18	25	41	58	90	121	155		
6	1	3	5	9	12	20	29	45	60	77	122	176
4	1	1	3	6	9	15	22	33	45	58	91	132
3	1	1	3	5	8	13	18	29	39	50	79	114
2	1	1	2	5	6	11	16	25	33	43	67	98
1		1	1	3	5	8	11	18	24	31	49	71
0		1	1	3	4	7	10	15	20	26	42	61
00		1	1	2	3	6	8	13	17	22	35	51
000			1	1	3	5	7	11	15	19	30	43
0000			1	1	2	4	6	9	12	16	25	37
250			1	1	1	3	4	7	10	13	20	29
300				1	1	3	4	6	8	11	17	25
350				1	1	2	3	5	7	10	15	22
400				1	1	1	3	5	7	9	14	20
500				1	1	1	2	4	5	7	12	17
600					1	1	1	3	4	6	9	14
700					1	1	1	3	4	5	8	12
750						1	1	3	4	5	8	11
800						1	1	2	3	4	7	11
900						1	1	2	3	4	7	10
1000						1	1	1	3	4	6	9
1250						1	1	1	2	3	5	7
1500							1	1	1	2	4	6
1750							1	1	1	1	3	5
2000								1	1	1	3	4
***14	6	11	18	32	44	73	104	160				
***12	5	9	15	26	36	60	86	132	178			
**14	7	12	20	36	49	81	116	179				
**12	5	10	17	29	40	66	95	147	197			
**10	4	8	13	24	32	54	77	118	159	204		
** 8	2	5	8	14	19	31	45	70	94	120	190	

Notes:
* Made in sizes 14 to 2 only.
** THW sizes from 14 to 8. All other THW sizes have same dimensions as T.
*** R and RH sizes with 2/64-in. insulation, 14 and 12 only.

Accompanying Table B gives the maximum number of small-diameter conductors of equal sizes permitted in existing concealed conduits, and the dimensions and computations are based on NEC Tables 3, 4, and 5, Chapter 9.

A practical example of Table B would be: An existing concealed ½-in. conduit can contain up to eight No. 12 TW conductors; or 15 No. 12 TW conductors are permitted in a ¾-in. conduit. In both cases, the conductor fill does not exceed 50% of the conduit cross-sectional area.

At the bottom of Table B, the notes explain that Type RU and RUH conductors are made in sizes 14 to 2 only. And Type R and RH conductors, which have 2/64-in. insulation for sizes 14 to 12, have cross-sectional area dimensions in between those of Type RW and T conductors. Therefore, Table B includes specific calculations for such Nos. 14 and 12 Type R and RH conductors.

Table B also includes the maximum permissible number of Type THW conductors for sizes 14 to 8. It should be pointed out that Type THW conductors larger than No. 8 have the same dimensions as Type T or TW conductors, and conduit sizes are computed on this basis.

On the other hand, Type THW conductors, 14 to 8, have larger overall dimensions than those of Type T or TW. As a result, Table B contains separate calculations for these sizes of THW conductors, which are based on the following data:

Size	THW Dimensions Dia.	Sq. In. Area
14	0.162	0.0206
12	0.179	0.0251
10	0.199	0.0311
8	0.259	0.0526

In NEC Table 3, Chapter 9, Type THW conductors are incorrectly listed as having the same dimensions as Type RW and RHH conductors. Since the appropriate NE Code-Making Panel has been advised of this error, it is likely that the next code edition will contain

TABLE C—Conductors and Conduit Area—Square Inches

Size AWG or MCM	Combination of Conductors for Rewiring Existing Concealed Conduits Where Not Included in Table B, With Type T, TW, RU, RUH, *R and *RH, **THW								
	1	2	3	4	5	6	7	8	9
18	.0088	.0176	.0264	.0352	.0440	.0528	.0616	.0704	.0792
16	.0109	.0218	.0327	.0436	.0545	.0654	.0763	.0872	.0981
14	.0135	.0270	.0405	.0540	.0675	.0810	.0945	.1080	.1215
12	.0172	.0344	.0516	.0688	.0860	.1032	.1204	.1376	.1548
10	.0224	.0448	.0672	.0896	.1120	.1344	.1568	.1792	.2016
8	.0408	.0816	.1224	.1632	.2040	.2448	.2856	.3264	.3672
6	.0819	.1638	.2457	.3276	.4095	.4914	.5733	.6552	.7371
4	.1087	.2174	.3261	.4348	.5435	.6522	.7609	.8696	.9783
3	.1263	.2526	.3789	.5052	.6315	.7578	.8841	1.0104	1.1367
2	.1473	.2946	.4419	.5892	.7365	.8838	1.0311	1.1784	1.3257
1	.2027	.4054	.6081	.8108	1.0135	1.2162	1.4189	1.6216	1.8243
0	.2367	.4734	.7101	.9468	1.1835	1.4202	1.6569	1.8936	2.1303
00	.2781	.5562	.8343	1.1124	1.3905	1.6686	1.9467	2.2248	2.5029
000	.3288	.6576	.9864	1.3152	1.6440	1.9728	2.3016	2.6304	2.9592
0000	.3904	.7808	1.1712	1.5616	1.9520	2.3424	2.7328	3.1232	3.5136
250	.4877	.9754	1.4631	1.9508	2.4385	2.9262	3.4139	3.9016	4.3893
300	.5581	1.1162	1.6743	2.2324	2.7905	3.3486	3.9067	4.4648	5.0229
350	.6291	1.2582	1.8873	2.5164	3.1455	3.7746	4.4037	5.0328	5.6619
400	.6969	1.3938	2.0907	2.7876	3.4845	4.1814	4.8783	5.5752	6.2721
500	.8316	1.6632	2.4948	3.3264	4.1580	4.9896	5.8212	6.6528	7.4844
600	1.0261	2.0522	3.0783	4.1044	5.1305	6.1566	7.1827	8.2088	9.2349
700	1.1575	2.3150	3.4725	4.6300	5.7875	6.9450	8.1025	9.2600	10.4175
750	1.2252	2.4504	3.6756	4.9008	6.1260	7.3512	8.5764	9.8016	11.0268
800	1.2908	2.5816	3.8724	5.1632	6.4540	7.7448	9.0356	10.3264	11.6172
900	1.4208	2.8416	4.2624	5.6832	7.1040	8.5248	9.9456	11.3664	12.7872
1000	1.5482	3.0964	4.6446	6.1928	7.7410	9.2892	10.8374	12.3856	13.9338
1250	1.9532	3.9064	5.8596	7.8128	9.7660	11.7192	13.6724	.....	.....
1500	2.2748	4.5496	6.8244	9.0992	11.3740	13.6488	.....	.....	.....
1750	2.5930	5.1860	7.7790	10.3720	12.9650	.....	.....	.....	.....
2000	2.9013	5.8026	8.7039	11.6052	.....	.....	.....	.....	.....
*14	.0230	.0460	.0690	.0920	.1150	.1380	.1610	.1840	.2070
*12	.0278	.0556	.0834	.1112	.1390	.1668	.1946	.2224	.2502
**14	.0206	.0412	.0618	.0824	.1030	.1236	.1442	.1648	.1854
**12	.0251	.0502	.0753	.1004	.1255	.1506	.1757	.2008	.2259
**10	.0311	.0622	.0933	.1244	.1555	.1866	.2177	.2488	.2799
** 8	.0526	.1052	.1578	.2104	.2630	.3156	.3682	.4208	.4734

% of Area	No. of Conductors	½"	¾"	1"	1¼"	1½"	2"	2½"	3"	3½"	4"	5"	6"
60%	1	.18	.318	.516	.90	1.22	2.016	2.87	4.43	5.94	7.63	12.00	17.33
40%	2	.12	.21	.34	.60	.82	1.34	1.92	2.95	3.96	5.09	8.00	11.56
50%	3 or more	.15	.265	.43	.75	1.02	1.68	2.395	3.69	4.95	6.36	10.00	14.445

* Nos. 14 and 12 only—Types R & RH—2/64-in. insulation. ** Nos. 14 to 8 only—Type THW. Other THW sizes have the same dimensions as Type T

similar dimensions of the Type THW sizes previously mentioned.

To illustrate the importance of stating the correct dimensions of THW conductors, assume that we have an existing concealed 2-in. feeder conduit, and that new feeder conductors are required to serve a load of 225 amps, 4-wire, 208Y/120 volts. If we assume that 4/0 THW conductors have the same dimensions as 4/0 RH, as implied in NEC Table 3, Chapter 9, four 4/0 conductors computed on this basis (1.9360 sq. in.) would exceed the maximum 50% fill permitted for the 2-in. conduit (1.68 sq in.). But using representative dimensions of THW, four 4/0's would have a total cross-sectional area of 1.5616 sq in., which is less than a 50% fill for the 2-in. conduit.

Accompanying Table C gives the dimensions of small-diameter wires for combinations not shown in Table B, and provides a simple method of determining the allowable fill of various conductor sizes for existing concealed conduits of given sizes.

When using Table C, follow the general instructions previously outlined for Table A, except, of course, that Table C conductor dimensions and conduit percentage fills apply only to rewiring existing concealed conduits.

For a typical application of Table C, assume an existing concealed 1-in. conduit. It is desired to install Type TW conductors of the following combinations: three No. 14's, three No. 12's, and three No. 6's. From Table C the dimensions are:

Conductors	Sq. In. Dimensions
3 No. 14 TW	0.0405
3 No. 12 TW	0.0516
3 No. 6 TW	0.2457
	0.3378 Total

(Continued on page 243)

Fresh Air and Humidity

Problems created by tightly insulated, electrically heated homes require refinements of existing practices to provide optimum comfort.

By Glydewell Burdick, *Wisconsin Power and Light Co., Madison, Wis.*

ELECTRIC heating is continuously excellent in the very cold weather, which is the most critical time. However, there are times when it could give better results, and at little extra cost. Today's way is to open a window or two when the air gets stuffy, stagnant, or too humid. We can do better than that. What are the conditions to be met, and what should be done to meet them?

Fresh Air

Our houses are tightly constructed, and properly so, to get infiltration down to about ½ air change per hr at the *design condition*, which usually means with a 15-mph wind at the coldest outdoor temperature. The natural air change will be less than that during most of the heating season, and in very mild and quiet weather may be almost none. If designed loosely (for one change per hr at the design condition), the situation in mild and quiet weather is little different than if designed for ½ change.

U. S. Navy experiments have shown that the minimum fresh-air requirement, without materially affecting human performance, is about 5 cu ft per min (cfm) per person. That gives a condition which can be tolerated, but it does not give comfort. For continuous occupancy, about 10 cfm per person is close to the minimum usually acceptable for comfort in residences. More is needed while cooking meals and for occupants smoking. Table 1 gives some applicable ASHRAE standards.

Take a 1200-sq-ft home as an example, having a volume of 9600 cu ft. One-half air change per hr represents 4800 cu ft per hr or 80 cfm. Without considering cooking or smoking, this is about the comfort minimum for eight people. Allowing for cooking and some smoking, it may be right for about four people.

Humidity

Normal home occupancy generates water vapor equal to about 25 pints of water per day according to published figures. We may assume that this varies considerably according to occupancy and family habits. With numerous house plants or uncovered crawl-space ground, for example, this figure would be materially exceeded. In the very cold weather this water vapor generation is good, and if it were not occurring we would have to humidify to keep the homes from being too dry. In the milder heating weather, however, there is likely to be too much water vapor.

Winter inside relative humidity desirable for health and comfort usually is in the range of 40 to 50%. Below 30%, static electricity sparks become an annoyance. The relative humidity which may safely be carried without impairment of insulation effective-

The Electric Heating Forum is devoted to discussions of electric space heating practices and problems. A subject frequently debated is the effect of insulation on indoor humidity and available fresh air. This month Glydewell Burdick explores contributing factors and suggests future courses of action.

Currently being considered by many utilities and industry associations is the newly proposed "All-Weather Comfort Standard," the most significant portions of which are presented here, together with an explanation of the new R-numbers used by mineral wool manufacturers to describe the performance of their products.

Readers are invited to express their opinions; relate their own experience data to the material presented; or submit new ideas, research data, news, or case studies on any aspect of electric space heating. Please address correspondence to:

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ness or structural damage ranges from less than 10% for loosely constructed houses to something over 30% for tightly constructed houses with excellent vapor barriers, when the outdoor temperature is 0 deg F or below. At 30F outdoor temperature, the permissible range is from 35% for loose construction to about 50% for tight construction.

Moisture condensation on windows is also a limiting factor in cold climates. It is undesirable to carry an inside relative humidity above 35% for outdoor temperatures of 0 deg F and below, unless triple glass is used.

Heavy insulation is essential for economical operation of electric heating, as well as for the comfort of warmer walls, floors, and ceilings. An excellent warm-side vapor barrier is necessary to keep internally generated moisture from penetrating walls and ceilings, damaging wood framing, and impairing the effectiveness of the insulation. The inside vapor barrier should have a moisture permeability rating of *not more than* 1 *perm*. The outside "skin" of the house should have a rating of *not less than* 5 *perms*, so that such vapor as does leak into the walls or ceilings will have a chance to escape. Vapor barriers on insulation batts are inadequate because of the joints every 16 in.—and wood readily transmits water vapor. To assure a perm rating of 1, such joints would have to be sealed or overlapped at least 4 in. Batts of this type should be supplemented with a barrier such as a sheet of plastic, which comes in widths up to 16 ft. Such an excellent warm-side barrier also aids in reducing infiltration at the design condition to the ½ air change per hr wanted for economical operation.

A few people selling electric heating recommend omission of vapor barriers in ceilings. Presumably this is an attempt to get rid of part of the internally generated moisture without increasing the initial cost, hoping that attic ventilation will remove any moisture. Consideration of the known physical facts shows several serious consequences of this procedure:

(1) impairment of insulation effectiveness
(2) damage to the wood structure
(3) increased attic ventilation requirement
(4) lower safe limit of inside humidity
(5) increased heating energy requirement.

Water vapor passing through the ceiling and its insulation condenses when it reaches the point where the temperature is the same as the dewpoint of the air which carries it. This soaks the insulation and adjoining framing. With changes in weather, the water or ice evaporates at times and accumulates at others. If the inside humidity is carried beyond a given point, the condensate will soak through and stain the ceiling. In the end, this is the most expensive way to get rid of air-borne moisture, as well as the least satisfactory.

Resultant Indoor Relative Humidities for Various Rates of Fresh Air Intake

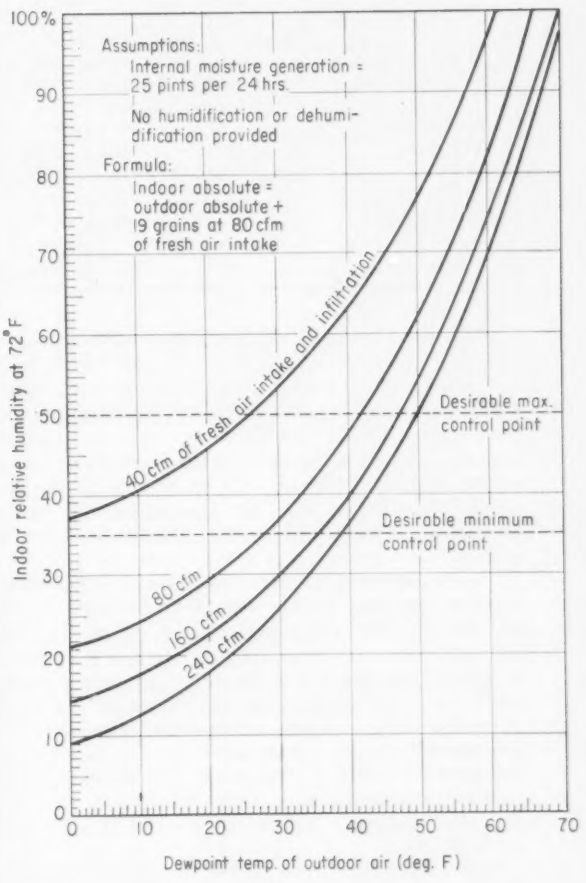


Table 1. Fresh Air Requirements

Occupancy	Fresh Air (cfm per person)	
	Recommended	Minimum
Residences, some occupants smoking	20	10
Offices	15	10
Retail stores	10	7½
General, occupants not smoking	7½	5
General, occupants smoking	40	25

Table 2. Practical Indoor Humidities

(Using Excellent Vapor Barriers)

Outdoor temperature	Indoor relative humidity
0 deg F and lower	35%
20F	40%
30F and higher	50%

Possible Solutions

With these considerations in mind, and assuming that the desirable structure, insulation, and vapor barrier are provided, it appears that the humidity control points shown in Table 2 are practical for electrically heated homes.

Table 3. Outdoor Dewpoint Temperatures

(Madison, Wis.)

Temperature (deg F)	Hours per year		
	Heating Season	Summer Season	Total
30 or lower	3744	42	3786
31 to 40	864	174	1038
41 to 55	858	690	1548
56 or above	342	2046	2388
Totals	5808	2952	8760

If 25 pints of water are internally generated each day, that quantity must be removed each day to hold the inside relative humidity at a constant level. With ½ air-change per hr (80 cfm), engineering calculations show that the inside air will have an absolute humidity 19 grains higher than the absolute humidity of the entering fresh air. At 40 cfm (¼ air-change per hr for 1200 sq ft), the differential will be 38 grains; at 160 cfm, 10 grains; and at 240 cfm, 6 grains.

The accompanying curves use these relationships to show resultant indoor relative humidities for 40, 80, 160, and 240 cfm intake of fresh air having outdoor dewpoints ranging from 0 to 70 deg F. It may be noted from the curves that, for our tight houses, mechanical exhaust or intake of outdoor air is a must at outdoor dewpoints much above 30F if indoor relative humidity is to be kept below 55%. Also, at dewpoints above 50F, forced ventilation at any reasonable rate fails to keep the humidity down to a comfortable level and one which is safe for the building and its contents.

The latter fact has caused trouble in electric heating installations in warm climates, such as in Florida and along the Gulf Coast. The same thing happens in most of our climates, although at different times of the year and for periods of shorter duration.

How many hours a year fall within various dewpoint temperature ranges? There is a different answer for each climate. For illustration, the record for a represenative year for the relatively cold climate of Madison, Wis., is shown in Table 3.

To combat the humidity and fresh air problems, a growing number of electric heating contractors are installing exhaust fans with humidistat control as a regular component of every heating job. They have found this to be an essential feature for customer satisfaction, and insurance against complaints. There are some instances where, in the very tight house desired for economy, use of the exhaust fan may fail to do the job in fairly mild weather, simply because there isn't sufficient crack area to permit air to leak in at the rate necessary to dry the inside air by dilution. The exhaust fan may draw a perceptible vacuum in the house and thus take in less fresh air then necessary to control humidity.

Conclusions

We are closing our eyes to the physical facts that exist during a material part of the heating season when we expect natural infiltration to care for either fresh-air requirements or the removal of water vapor. The cure for one difficulty will cure the other, most of the time. Natural infiltration varies from a sufficient rate at the design condition down to almost none in mild quiet weather. The occupants are forced into the nuisance of opening and closing windows, with resulting uncontrolled rates of fresh air intake. The minimum acceptable corrective action is the above-mentioned exhaust fan with reliable humidistat control.

Some twenty years ago it was discovered that our automobiles were more comfortably heated when pressurized with heated air. Cold air did not then leak in around the cracks and cause discomfort. We can and should do the same thing with our homes: build them as tightly as we know how, and provide positive, continuous intake and tempering of fresh air at the rate desired for comfort and economy. The basic rate of intake may be 80 cfm, perhaps as low as 40 cfm. A 2-speed or 3-speed intake fan can give the higher rates as needed for increased fresh air supply or increased atmospheric dehumidification. Where requirements exceed the capabilities of the intake fan, it may be supplemented by an exhaust fan. Air-exhaust outlets would be located in the kitchen and bathroom. Methods of providing automatic variations in exhaust apertures may be incorporated if required.

The fresh air taken in may be tempered to about room temperature by a duct heater of the proper size and delivered at a suitable location, such as by means of a baseboard diffuser in a hallway near the living room. Since duct-heater capacity costs less than and replaces in-space capacity, the saving partially offsets the extra cost of the fan, duct, and control. We need a manufactured unit including fan, heater and thermostat. When the demand becomes known, it will be provided. (For −15F design temperature and 80 cfm, for example, the duct heater required would be about 3000 watts.)

This still leaves unsolved the problem of dehumidification at outdoor dewpoints above 50F, and mechanical dehumidification appears to be the only answer. The requirement for an average home is a straight dehumidifier of about 1-hp size, with 2500 to 3000 Btu/hr latent removal capacity at say 75F and 55% RH entering air. It is an essential step toward the year-round electric climate-control goal.

Electric Heating Films

Electric Heating Goes to School; 18 minutes; full color; sound. Available on loan from Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh 8, Pa.

Produced for the benefit of school board members, architects, consulting engineers, and school planning personnel. The story follows a typical suburban school board through its investigation leading to the choice of electric heat for a proposed new school.

How to Insulate for Electric Heating; 23 minutes; full color; sound-slide. Available on loan to contractor groups from Owens-Corning Fiberglas Corp., Toledo 1, Ohio.

Complete instructions for applying insulation to floors, walls, and ceilings, plus data on the principles of design and condensation.

All-Weather Comfort Standard

Proposed design heat losses and thermal performance factors for electrically heated and/or air-conditioned homes.

THE commonly used 6-4-2 concept of insulating electrically heated houses has been criticized often as a "standard" because it refers to inches of insulation without regard to insulating performance, and its use presupposes that houses in all geographical areas profit equally by such insulation.

In an attempt to provide an improved industry standard for electrically heated and/or air-conditioned homes, a committee of interested personnel began work with a round-table meeting in April, 1959, out of which has emerged the "All-Weather Comfort Standard." Instead of recommending amounts of insulation, the Standard proposes maximum design heat losses based on geographical location (Table 1) and maximum heat-loss factors for various building sections (Table 2).

The entire Standard, including also recommendations regarding infiltration, ventilation, vapor barriers, and slab floors, was introduced at the First National Electric House Heating Symposium and Exposition in Chicago last March. Since it had no official sponsor, it was submitted to trade associations and electric utilities for study and possible voluntary adoption.

The values given are not meant to represent the "break-even" point between insulation costs and savings in operating costs. Proven better results are being achieved today. However, they do provide a yardstick by which the installer or designer can determine whether his projected installations are likely to provide reasonable "comfort and operating economy," as claimed in the Standard.

Values listed assume glass area to be no more than 15% as great as the floor area of the heated space. Where greater percentages exist, one or more of the given performance values must be bettered if the heat-loss figures of Table 1 are to be realized. Where construction prevents the realization of any of the U-values of Table 2, others may be reduced to make up the loss.

For example, design heat-loss calculations for a house insulated so as to attain the U-factors of Table 2 result in a heat loss exceeding the appropriate value of Table 1. A check of glass area shows it to be 20% as great as the floor area. Since all available wall space has been filled with insulation, more insulation should be added to the ceiling or floor or both to reduce heat loss in these areas until the value shown in Table 1 has been approximated.

Table 1. Recommended Heat Loss Values

Degree Days	Design Heat Loss per sq ft of floor area	
	Btuh*	Watts
Over 8000	40	11.7
7001 to 8000	38	11.3
6001 to 7000	35	10.3
5001 to 6000	32	9.4
3001 to 5000	30	8.8
Under 3001	28	8.2

* Btuh is commonly used as an abbreviation for "Btu per hr."

Table 2. Thermal Performance Values

Building Section	U-Value† Btuh per deg TD
Ceiling	0.05
Frame walls	0.07
Masonry walls	0.12
Floors over vented spaces	0.07
Floors over unheated basements	0.09
Slab edge heat loss	30 Btuh per linear ft

† Calculated in accordance with the method described in current ASHRAE Guide, before correction for framing.

Table 3. Recommended Installed R-Numbers for Electric Heating and/or Air Conditioning*

Building Section	U-factor† (Btuh)	R-Number
Ceilings	.05	19
Frame walls	.07	11
Floors over vented crawl space	.07	13

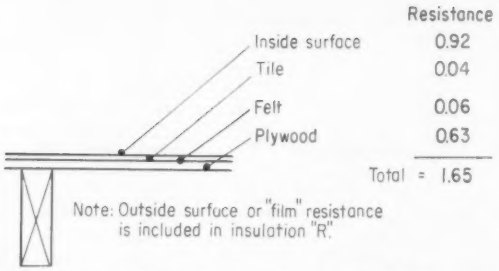
* National Mineral Wool Assn.
† From All-Weather Comfort Standard.

R-Numbers

The new "R-numbers" adopted by the mineral-wool industry to describe insulating products were designed to facilitate compliance with the All-Weather Comfort Standard. The R-number indicates the thermal resistance of the insulation which, when the insulation is installed in standard frame ceilings, walls, and floors, will insure the U-factors specified in the Standard for these building sections.

Variations in finishing materials used for floors, walls, and ceilings (both inside and outside) will cause variations in the thermal resistance of the section; however, the resistance of the insulation is so much greater than that of the building materials that such slight variations may be neglected. The R-numbers are expressed as whole numbers.

Example: What is the thermal resistance of the insulation required to attain a U-value of 0.007 through a frame floor consisting of a ½-in. plywood subfloor plus ⅛-in. asphalt tile over the joists?



Solution[1]: As shown in the sketch, the total thermal resistance of the floor between joists without insulation is 1.65. The resistance of a floor with a 0.07 U-factor is 1/.07 or 14.3. Therefore, the thermal resistance of the insulation required is the difference, 14.3 — 1.65, or 12.65. The R-value of the insulation would thus be 13.

For standard frame house construction, similar calculations give R-values for insulation in ceilings and walls, as shown in Table 3.

Thus, installing mineral-wool batts labeled R19, R11, and R13 in ceilings, walls, and floors, respectively, insures U-factors of 0.05, 0.07, and 0.07 Btuh per sq ft per deg F in these sections.

While the All-Weather Comfort Standard has been proposed only after much study and consideration of all factors involved, it is to be expected that field experience will ultimately point the direction and extent of improvement if such are needed.

[1] See "Calculating Heat-Loss Factors" in Electric Heating Forum No. 2, *Electrical Construction and Maintenance*, August, 1960.

Electric Heating Equipment Sales, 1959

THE data presented in these three tables were obtained from a survey of all known manufacturers of electric heating equipment by the Building Materials Division of the Business and Defense Services Administration, U. S. Dept. of Commerce.

The annual volume of space heating equipment manufactured for habitable structures was reported as approximately $387 million:

Source of Heat	*Percent of Total*
Gas	46
Oil	42
Electricity	7
Solid fuel	5

Table 1. Output and Dollar Value* of Shipments

Type	Heating Output (Btuh x 1000)	Total Value	Percent of total value
Baseboard (not including glass panels)	9,571,986	$8,325,587	29.9
Convectors			
Without fan	1,618,280	5,596,254	20.1
With fan	1,138,839	4,250,219	15.3
Glass panels			
Baseboard	590,819	660,936	2.4
Radiant	234,101	1,432,897	5.1
Unit heaters and unit ventilators	666,601	5,654,322	20.3
Warm air furnaces			
Central	54,660	88,828	0.3
Floor	21,807	51,701	0.2
Wall	66,760	210,522	0.8
Cable systems, fabricated as			
Units	589,239	1,095,607	3.9
Cable only	85,520	467,421	1.7
Total	14,638,612	$27,834,294	100.0

Source: Dept. of Commerce (BDSA)
* As reported by 58 manufacturers.

Table 2. Shipments in Units

Type	Number of Units
Baseboard	2,269,880 lineal feet
Convectors	
Without fan	330,395
With fan	152,650
Unit heaters and unit ventilators	171,842
Warm air furnaces: central, floor, and wall	9,482
Cable systems (fabricated as room units)	123,324

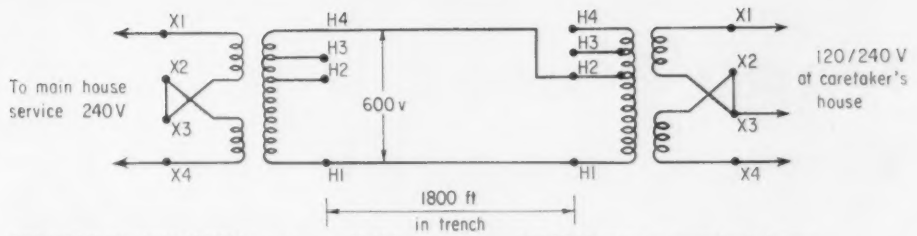
Source: Dept. of Commerce (BDSA)

Table 3. Distribution by Destination of Shipments

Census geographic division	Shipments	
	Value	Percent
New England	$1,209,725	4.3
Middle Atlantic	2,595,842	9.3
East North Central	4,208,720	15.1
West North Central	2,354,100	8.5
South Atlantic	2,892,600	10.4
East South Central	3,705,907	13.3
West South Central	1,382,117	5.0
Mountain	916,472	3.3
Pacific	5,961,755	21.4
Exports	82,921	0.3
Destination of shipments not available because of method of distribution of six manufacturers	2,524,135	9.1
Total	$27,834,294	100.0

Source: Dept of Commerce (BDSA).

Of the manufacturers contacted, 13 who did not manufacture electric heating equipment in 1959 stated that production was contemplated in 1960 or soon thereafter.



600-VOLT TRANSMISSION saved over $2600 in supplying 120/240 volts to caretaker's house.

A little extra

Small-Job Engineering

shows that the obvious way is not always the best way to do the job.

By **William C. Miller, P.E.,** *Consulting Engineer, New York City*

SOMETIMES a relatively small amount of study can result in a large amount of money cut from a job. What is frequently needed is a separate approach to each problem. Too often we find that methods are used more from familiarity than from the demands of the job. Simple fundamental principles applied in each instance pay off.

The contractor on the job proposed a 3-conductor 1/0 VCL cable to handle the current required at a reasonable voltage drop. This material would cost approximately $1800 per 100 ft, totaling about $3240—a frightening figure.

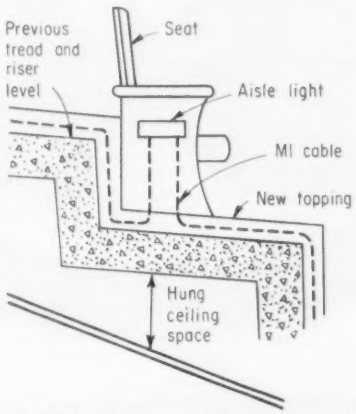
Since standard cable is insulated at 600 volts, why not look into the possibility of using it fully? We investigated transformers. An air-cooled, 600/120-240 volt transformer with two 5% taps on the high side and rated at 10 kva would cost $217. This quickly showed we were on the right track. We next considered cable size. We found we could take a 10% voltage drop in the 600-volt line and still deliver the same voltage as at the source. Taking another 3% as a reasonable reduction in available voltage at full load, we had a total of 13% which could be dropped in the line. This then was 78 volts against the 7.2 volts we could reasonably drop in the 240-volt line.

For a load of 10 kva at 600 volts, the line would have to carry a current of approximately 17 amps. For a 78-volt drop at this length and this current with cable buried in the earth, a No. 10 wire is suitable. We can buy single-conductor No. 10 Type USE or Type UF direct-burial cable for approximately $42 per 100 ft. Total costs are then

Transformers	$434.00
Cable	151.00

or a total of approximately $600.

The power lost in transmission is about 1000 watts higher at full load using the higher voltage drop. At an average demand then, the loss would be an additional 300 watts at a cost of about $10 per year. This extra expense in operating cost appears justified when it is balanced against approximately $150 a year in interest on the added investment in cable which transmission at the lower voltage would require. For approximately one hour's worth of study, the result to our client was a potential saving of $2640! Of course, the results here are more spectacular than can usually be expected; but a simple voltage study can often result in a substantial saving.



MI CABLE shaped to follow contour of theatre floor made chopping of existing floor unnecessary.

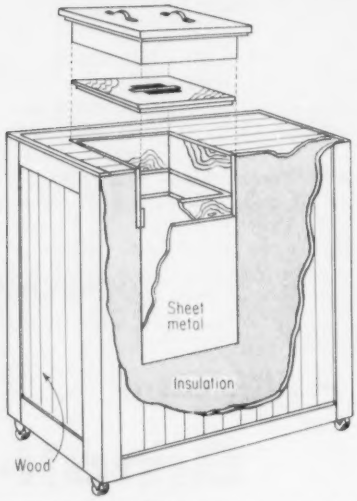
On another job we were presented with the problem of supplying a proposed air conditioning system on the 20th through 26th floors of an existing building. The cost of feeder cables and their installation appeared to be the single largest expense for electrical equipment. In this case we found that, by specifying a 750-kva transformer to bring the entering 120/208-volt 3-phase current up to 440 volts, considerable savings resulted. Not only did we save on copper and conduit, but we saved considerable wall-chopping and patching, inconvenience, labor, and switch costs.

Let us cite one further example. In a theatre alteration the aisle lights on the balcony seats were to be wired. The architect had specified a new topping on the steps. Rather than cut the existing floor and run conduit in the hung ceiling below, we studied the condition at the floor level. We concluded that by using mineral insulated (MI) cable we could easily have the cables formed to the new risers and treads and yet remain below the new topping. Here again the percentage savings were significant. Our arithmetic shows us that if we save 20 to 50% on enough parts of a job, we may finish with a 20% saving.

Deep-Freeze Unit For Depressed Temperature Tests

How to build an economical, practical deep freeze unit for small shop or laboratory use.

By Nelson Risch, *Norwood Works, Allis-Chalmers Mfg. Co., Norwood, Ohio*



CUT-AWAY SKETCH of unit showing details of interior construction.

WITH the growing demands on the special services of the small laboratory and workshop, a full complement of tools and equipment is a necessity. Many pieces of equipment incorporating precise control and instrumentation are being called upon to operate under extreme temperatures. Testing under these conditions is essential to guarantee satisfactory field operation. Hence, a deep-freeze unit can be a valuable addition to laboratory or shop facilities.

The unit described below can be built at a reasonable cost with easily available materials. It will hold temperature down to −72°C for an indefinite period of time.

Material items for this unit include the following:

One-inch thick boards (free from knots)
Waterproof paper
Cold temperature insulation
Moisture-proof insulating paper
25-gage galvanized iron
Thermometer (suitable range)
Coolant for refrigeration
Cabinet handles
Casters

The completed wood box is lined with waterproof paper. Cold temperature insulation is then added. Four-inch thick Styrofoam boards prove very satisfactory. The insulation should be moisture-proofed with waterproof paper or an epoxy resin and must be at least 8 in. thick.

When the insulation is in place, a sheet-metal container with a wood molding around the top is then inserted in the center of the box. Another layer of waterproof paper is placed on top of the insulation and the box top nailed in place.

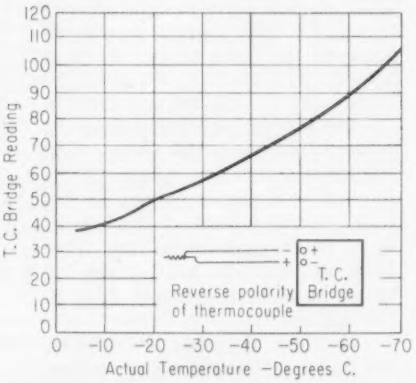
Two lids are recommended for the well above the container. The inner lid is a piece of plywood with a recessed wooden handle and tube-type insulator nailed around the outer edge. The outer—or top—lid is insulated with 4 in. of insulation board; is protected with a sheet-metal cover; is outlined with a tube-type insulator; has cabinet-type handles. The addition of casters adds mobility to the freezer.

Since the deep-freeze unit has no forced-air circulation, a wet bath is necessary for steady-state temperature testing of samples. Isopropyl alcohol, 98/100% pure, is used for the wet bath for an accurate means of measuring temperatures. If the wet bath is not desired, a copper constantan thermocouple may be used with a thermocouple bridge, with the thermocouple polarity reversed.

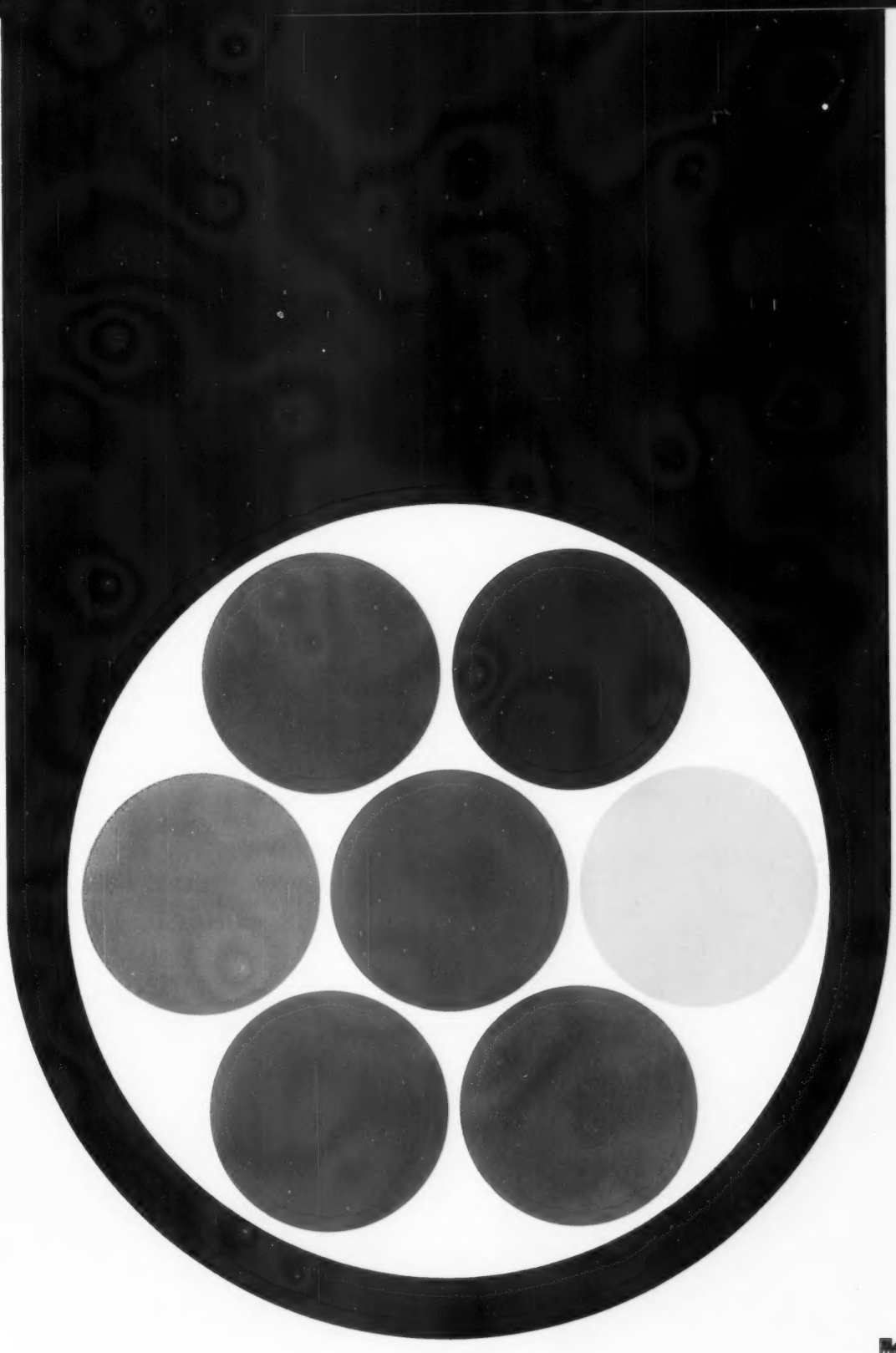
COMMON FREEZING BATH MIXTURES

MIXTURE	TEMPERATURE CHANGE—DEGREES C FROM	TO
Common Salt (NaCl), 1 part; Snow, 3 parts	0	−17.7
Common Salt (NaCl), 1 part, Snow, 1 part	0	−18.0
Calcium Chloride ($CaCl_2$), 3 parts; Snow, 2 parts	0	−32.7
Calcium Chloride ($CaCl_2$), 2 parts, Snow, 1 part	0	−42.2
Sal Ammoniac (NH_4Cl), 5 parts; Saltpeter (KNO_3), 5 parts; Water, 16 parts	10.0	−12.2
Sal Ammoniac (NH_4Cl), 1 part; Saltpeter (KNO_3), 1 part; Water, 1 part	7.7	−23.8
Ammonium Nitrate (NH_4NO_3), 1 part	10.0	−16.1
Potassium Hydroxide (KOH), 4 parts; Snow, 3 parts	0	−37.2

NOTE: Dry Ice (carbon dioxide highly compressed and in a solid state) can be used as a refrigerant for freezing above mixtures of from −40°C to −72°C, or used to obtain temperatures.



REFERENCE GRAPH showing correlation between thermocouple bridge readings and actual temperature inside cabinet.



IN ELECTRICAL WIRE & CABLE . . . **THE SPARK OF QUALITY IS KAISER WIRE EXPERIENCE**

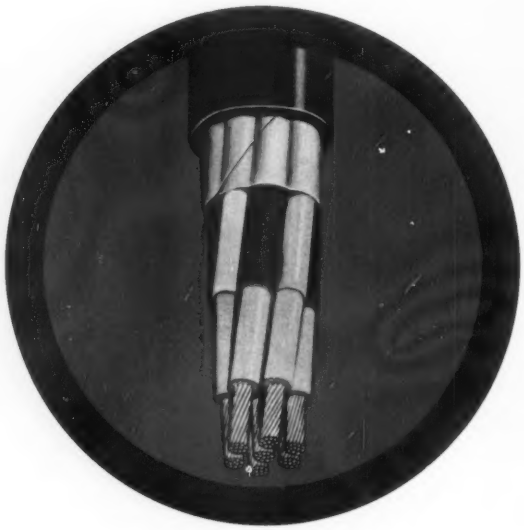
CONTROL CABLE... 28 YEARS OF PERFECT INSULATION SERVICE

KAISER MASTER LAYTEX® CONTROL CABLE has never known a reported insulation failure!...and the introduction of patented Laytex-Resin promises to improve upon this 28-year record of perfection!

Laytex-Resin is the combination of Laytex insulation with a specially-compounded resin layer over the insulation that eliminates the bulk of braided coverings. It brings the following advantages over extruded constructions:

Smaller diameter, to expand service without enlarging ducts...less weight...increased flexibility...proven greater insulation protection against acids, alkalies, flame, fungus, water, oil, ozone and light...uniform protection free of thin spots...can't wick moisture or fray...easier splicing...brighter color coding and longer lengths per reel.

SPECIFY 935-S. ASK FOR KAISER CONTROL CABLE BOOKLET.



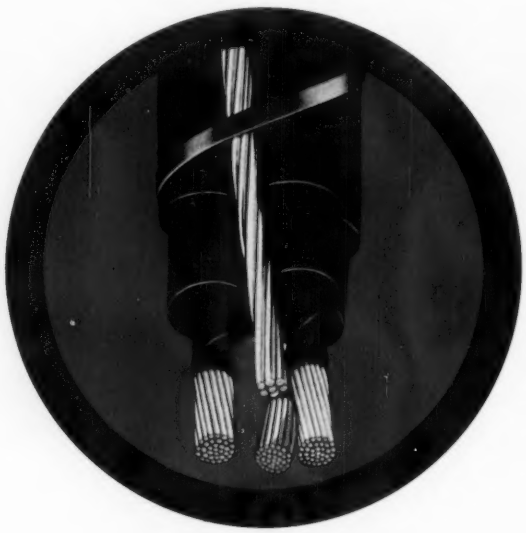
POWER CABLE... 16.4 TIMES MORE OZONE RESISTANCE

KAISER GRIZZLY® POWER CABLE is the only power cable to resist 6000 hours of high ozone shock test—outlasting 9 leading brands tested!

Several samples of each unshielded 5KV cable were placed with a "U" bend resting on a grounded metal plate. A conductor-to-plate potential of 40,000 volts was applied until all cables failed. Four brands failed immediately. The last competitor gave out 432 hours before the first Kaiser cable. Kaiser Grizzly samples went on to last over 6000 hours . . . 16.4 times longer than the test average of best performances . . . 2.4 times the life of the nearest competitor.

The reason: A superior combination of Kaiser insulation and jacketing. In power cables it represents a major victory over the main cause of failure—dielectric breakdown due to ozone.

AVAILABLE IN A WIDE RANGE OF SIZES AND SPECIFICATIONS FOR OVERHEAD AND UNDERGROUND HIGH-VOLTAGE APPLICATIONS.



K/W PORTABLE CORD... NEARLY THREE TIMES AS MUCH SERVICE

KAISER MASTER LAYTEX® PORTABLE CORD is tested and proven to give nearly three times the service, on the average, of cords of equal price. A saving of two-thirds in actual cord costs on the job!

This superiority came from Kaiser research into all causes of portable cord failure—more than 12,000 individual tests comparing more than 1000 cords of all makes.

The results: Patented K/W portable cord with a lead-cured 60% Neoprene jacket surpassing ASTM D-752 requirements from 15% to 100%... rayon fillers for overall resistance to pull... fibrous core inside the conductors to absorb strain, increase flexibility . . . conductors perfectly centered in grainless Kaiser Laytex insulation which has three times the strength of milled natural rubber.

SPECIFY NO. 920 FOR HEAVY DUTY (600 V.), NO. 921 FOR LIGHT DUTY (300 V.). ASK FOR KAISER MASTER LAYTEX® PORTABLE CORD BOOKLET.

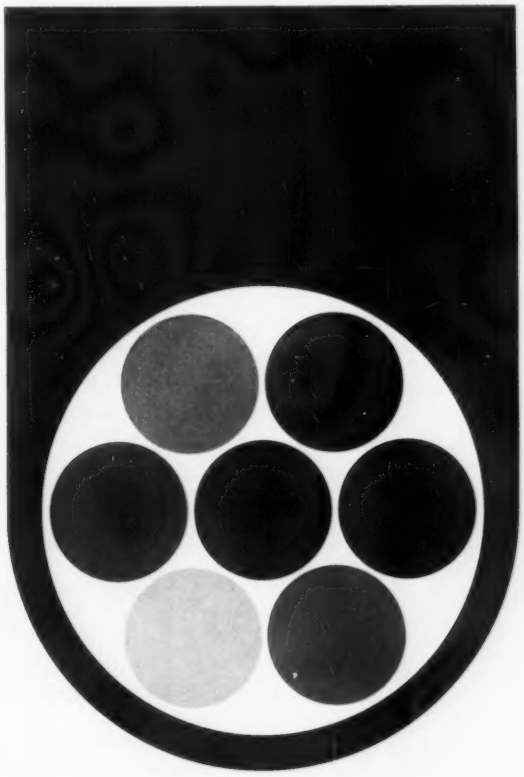
IN ELECTRICAL WIRE & CABLE THE SPARK OF QUALITY IS K/W EXPERIENCE

The spark of quality means positive—often dramatic—savings in service for those who will specify Kaiser wire and cable.

Among the world's leading electrical wire and cable producers, only Kaiser is heir to the 70-year experience of a major rubber company in developing insulation and jacketing compounds.

Insulations such as Laytex®, Laytex-Resin, Hydrosec® and Kalzone give greater utility, longer life to a complete range of aluminum or copper conductors. For immediate service in any type of wire or cable, call your K/W Distributor or Kaiser Aluminum & Chemical Sales, Inc., Kaiser Center, 300 Lakeside Drive Oakland 12, California.

KAISER ALUMINUM



here,

there . . .

almost everywhere

Members of the specially trained, 70-man field auditing staff of the Audit Bureau of Circulations* make regular calls on 2,900 publications . . . ours included . . . located in almost as many places.

The ABC auditor's call might last a day, a week, or even several months . . . just as long as it takes him to make a complete audit of our circulation records and obtain the information about our circulation audience that ABC will later publish.

Actually, he is working for you — our readers and our advertisers. Knowing full well that we will stay in business only so long as our publication continues to serve the interests of our readers, this audit of our *paid* circulation provides us with a regular and objective review of how well you think we are doing.

Knowing full well that sales messages must reach a responsive audience in order to be effective, our advertisers are also interested in the ABC auditor's call. The hard, and sometimes cold, facts he reports about our circulation provide you with an informed basis for investing your advertising money.

Yes, the ABC auditor has been here . . . and he will be here again, calling to check on how well we are doing our job and to provide the facts to help us *and our advertisers* do even better.

ELECTRICAL CONSTRUCTION AND MAINTENANCE

A McGRAW-HILL PUBLICATION
330 WEST 42nd STREET, NEW YORK 36, N.Y.

* This publication is a member of the Audit Bureau of Circulations, an association of nearly 4,000 publishers, advertisers, and advertising agencies. Our circulation is audited by experienced ABC field auditors. Our ABC report shows how much circulation we have, where it goes, how obtained, and other facts that tell you what you get for your advertising money when you use this publication.

Isolated Electrical System For Missile Base

Self-sufficient deisel-engine generators furnish all power needs through 4160-volt switchgear.

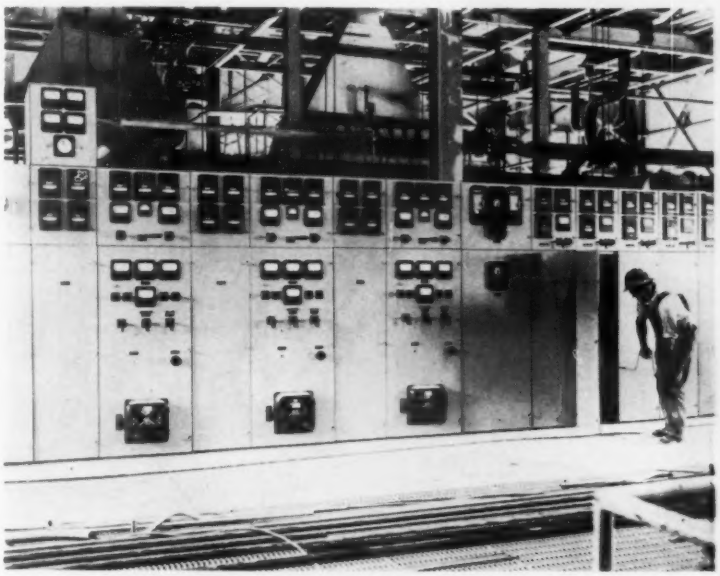
A COMPLEX electrical installation distributes, controls and protects vital power for the new Bomarc missile site at Dow Air Force Base, Bangor, Maine. Equipment includes high- and low-voltage circuit-breaker switchgear, power transformers, lighting panels, distribution and power panels and motor control centers.

The electrical power system at the site is completely self-sufficient. Power, supplied by three diesel-engine generators, feeds directly to 4160-volt indoor switchgear—consisting of 13 frames with three generator circuits and five feeder circuits. From this switchgear, power feeds to three low-voltage substations—two outdoor and one indoor-outdoor—equipped with 3-phase hookups of single-phase, 333-kva transformers which step down voltages from 4160 to 480 volts. A total of ten oil-insulated, self-cooled transformers are used in this installation.

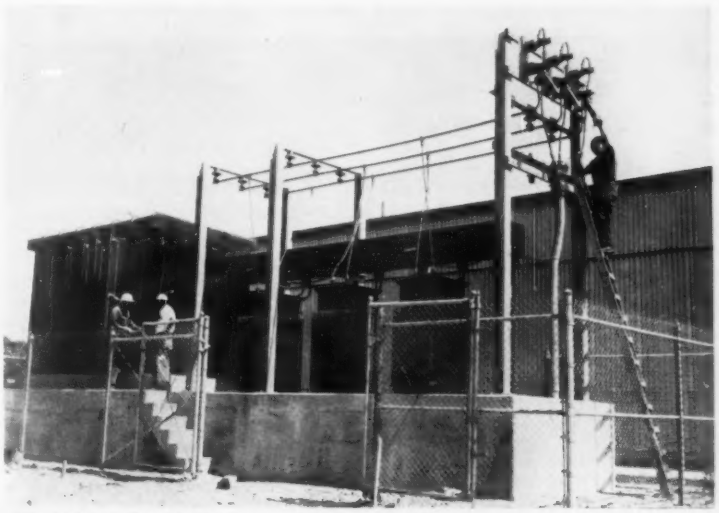
The substations provide economy and flexibility. They incorporate low-voltage power breakers and molded-case CBs for feeder protection. The steel structures used at each outdoor substation were designed and built specifically for this installation to provide for rapid, convenient interchange of the single-phase transformers for maintenance and service.

The Dow installation has 28 missile launchers, each housed in 60-ft-long reinforced concrete buildings. Each building has a special roof consisting of two sections which slide apart when the missile is elevated for firing. The 47-ft missile is capable of speeds up to about Mach 3 and has a range of 250 miles. It is controlled by a radar-computer system which obtains altitude, speed and heading information and converts it into control signals which guide the Bomarc to intercept hostile aircraft.

The U. S. Army Engineer Division, New England, Corps of Engineers, was the construction agency for USAF. The electrical contractor was J. Livingston Company, Boston, Mass. Architect-Engineers for the project were Fay, Spofford and Thorndike, Boston, Mass., and A. J. Harriman, Auburn, Maine.



4160-VOLT SWITCHGEAR in powerhouse at missile base provides control and protection for circuits from three generators and outgoing feeder circuits to load-center substations.



OUTDOOR SUBSTATION is fed from generators in the powerhouse through conduit terminated in pothead at right. Three 333-kva single-phase transformers are connected for 4160-480 volt stepdown. Construction of the concrete base, the steel structure and the fence provide for fast and effective interchange of transformer units for maintenance or fault replacement.

NEW HI-VOLTAGE CABLES FROM THE BRONCO STABLES

BRONCO Certified 66 NEOPRENE

portable 3KV & 5KV

To its string of tough, high-spirited, Bronco blue-ribbon champions Western Wire now adds **hi-voltage cables** bearing the proud brand BRONCO 66 **CERTIFIED.** The outer protecting jacket is **certified** to contain not less than 67.32% neoprene—highest content in the industry! And now—on the inside—BRONCO 66 Hi-Voltage cables are insulated with BRONCO XL BUTYL. This double-barreled protection assures you championship performance . . . a neoprene hide with maximum resistance to ozone, sunlight, oil, abrasion . . . a heart of butyl, dielectrically strong, amazingly resistant to high temperatures, corona, and aging. A big **plus value** is Bronco's patented branding; complete identification is repeated at precise two-foot intervals on the jacket—vulcanized in so it won't rub off. Bronco 66 **Certified** Hi-Voltage types W, G, and SH (shielded types A, B, C, and D) are now available immediately to users through Electrical Wholesale Distributors. They're champing at the bit, raring to go to work for you. When you invest in a big cable for the long haul, call for the service champ—BRONCO 66 **CERTIFIED!** Enjoy the long-term economy of top quality.

Write for a complete description of portable Hi-Voltage Bronco 66 Certified. Also ask for data on our duct and direct burial hi-voltage items.

WESTERN INSULATED WIRE COMPANY
Los Angeles 58, California

Hydraulic-Lift Crane Speeds Overhead Work

A fast finish is applied to light poles on Illinois' East-West Tollway by a hydraulic-lift crane, with aerial basket attached. Two men—truck driver and high-riding maintenance man—put the finishing touches on these 30-ft poles at the rate of 24 per day, to wind up the job for Premier Electric Company, electrical contractors of Chicago, Ill. The contract called for complete installation and preliminary maintenance of 460 lighting units.

Premier Electric uses its versatile lift for a variety of jobs, including installation of signs and other electrical facilities for commercial and government needs. The mobile unit is also used to handle poles, transformers and other equipment with speed and safety. Both men and tools can be put aloft in seconds for quick work on overhead jobs. The hydraulic swinging boom permits inch-close positioning. And the self-unloading truck can be used to haul materials and equipment.

HYDRAULIC-LIFT CRANE has aerial basket for mechanic permitting a comfortable work position for servicing of high-mounted equipment. Just two of the electrical contractor's men put finishing paint touches on 24 poles in one day

Low-Voltage Switching Plus Dimmers for Residential Lighting

Lighting control using low-voltage relays and transformer-type dimmers adds to the convenience of modern living in the two-story home of Mr. and Mrs. Jack Podell in Pleasantville, N. Y.

Seven 8-position Remcon master switch units at entrances and in

NIAGARA

TRANSFORMERS

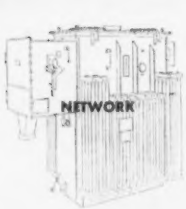
"No exceptions. Not a single Niagara Transformer reaches the shipping platform without being thoroughly tested."

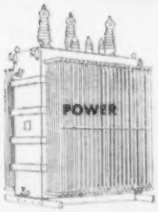
At Niagara, product quality is watched all along the line... starting with raw materials. To win an "ok" for shipment, completed transformers must pass rigid performance tests. Not only do they conform to NEMA and ASA standards, but in many ways exceed them.

Designed with liberal overload capacity, Niagara Transformers are produced for practically every service through 10,000 kva, 69,000 volts. Write for Bulletin 139. Niagara Transformer Corp., P.O. Box 23, Buffalo 25, N. Y. Representatives in principal cities.

"Before they leave here, every one gets a stiff test."

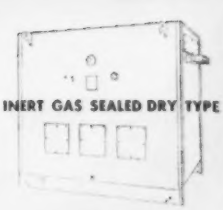
POLE TYPE


NETWORK

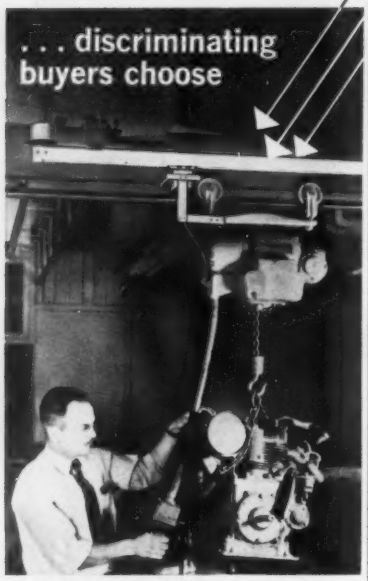

POWER

VENTILATED DRY TYPE

UNIT SUBSTATION


INERT GAS SEALED DRY TYPE

GOOD REASONS WHY...



FEEDRAIL Crane and Hoist Electrification

The right choice of an electrical system for cranes and hoists is reflected in increased operating efficiency and lower costs. In addition to unfailing power, you need the safety to equipment and personnel given by steel enclosures. You need compactness and adaptability, a flexibility to meet electrical requirements of tomorrow as well as today. And you need a system low in installation cost, easy to maintain during the life of the crane or hoist.

That's why thousands of companies have selected FEEDRAIL Crane and Hoist Electrification Systems with the movable trolley outlets that travel right along with the crane or hoist.

Why not get the details about FEEDRAIL today?

For safety, adaptability and convenience electrify with . . .

FEEDRAIL®
TROLLEY BUSWAYS

FEEDRAIL CORPORATION
DEPT. C-5, 125 Barclay St., New York 7, N. Y.
Please send Bulletin No. 76 "Feedrail Crane and Hoist Electrification Systems"

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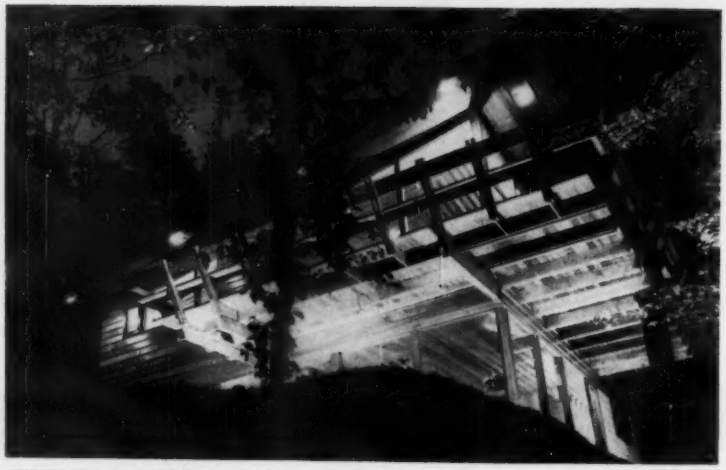


EXTERIOR LIGHTING, including recessed incandescent eave fixtures over balcony terrace and floods positioned on balcony framing members, is controlled both from terrace entrance and from master bedroom by 6-volt switches.

LIVING-DINING AREA lighting includes 70 running feet of shielded fluorescent strip at junction of wall and ceiling and recessed incandescent fixtures in ceiling around two sides of center firelapce. Dimmers and low-voltage switches are visible above counter top at right. Blank section adjacent to fluorescent strip at upper right houses low-voltage relays.

master bedroom plus 2-, 3-, and 4-switch units throughout the remaining rooms provide multi-point control of all lighting on both levels, eliminating many needless steps. Luxtrol dimmers in living room and downstairs playroom circuits permit control of lighting intensity in these areas to suit the activity.

Attractively situated on hilly terrain, the house is highlighted at night by fixtures recessed into the eaves above the cantilevered terrace, by floodlights mounted on the underside of the balcony, and by the spill of interior light through the glass walls of the living room.

Electrical work was done by the Aucello Electric Corp., Thornwood, N. Y.

SKYLIGHTS furnish natural light to passageway from main entrance to living room on upper floor. A single 40-watt fluorescent lamp in each plastic diffuser converts skylights to luminaires after dark.

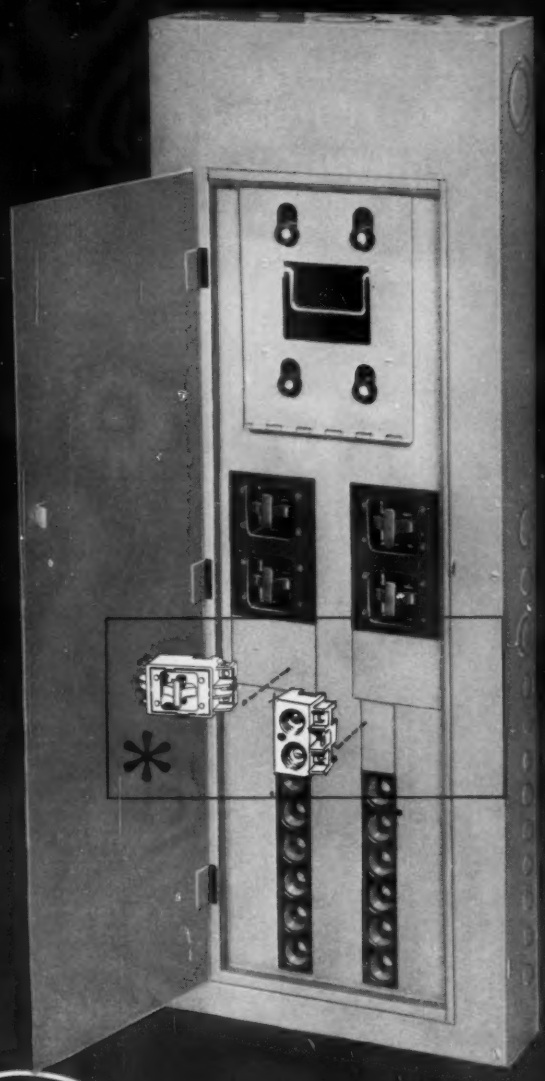
Phase Identification on 3-Phase Ungrounded Circuits

An industrial plant maintenance electrician was faced with the problem of identifying specific phase conductors of a 440-volt, 3-phase, ungrounded distribution system at two distantly separated parts of the plant. The conductors had no identifying tags or color coding. The following is the test procedure he developed.

At the time of the test, all phases were clear to ground, except for a capacity voltage of about 300 volts. His first step was to connect four 100-watt, 110-volt lamps in series between one phase conductor and ground where the circuit originated at the entrance switchgear busbars. This artificially grounded

NEW!

200-AMP ADD-ON* SERVICE Equipment



HINGED MAIN PULLOUT!

ARROW AH HART

FLEXIBLE and VERSATILE... All 200-amp "Add-On" pullout and branch circuit units are interchangeable with A-H 100-amp "Add-On" units. Now you meet any customer's 200 amp electrical needs—present *or* future—with just one unit. This unit comes factory-assembled with a main 200-amp pullout, four 30- or 60-amp pullouts and twelve fused branch circuits . . . and you can add 1 or 2 pullouts and 2 or 4 branch circuits at any time with a maximum of 6 pullouts and 16 branch circuits. Exclusive hinged main pullout for convenience.

COMPACT ENCLOSURES... smaller than other comparable units, save space and make faster installations. The 14⅜″ width allows mounting between studs.

FAST, EASY INSTALLATION... is insured by extra wiring space throughout the enclosure . . . including full 5″ head space for incoming service lines. Ample knockouts are located adjacent to the branch circuits. Neutral terminal bars will accept wire sizes 4 to 14.

GET ALL THE FACTS. Write today for complete information. Department ECM, The Arrow-Hart & Hegeman Electric Company, 103 Hawthorn St. Hartford 6, Conn.

ARROW AH HART

Quality since 1890

ENCLOSED SWITCHES • WIRING DEVICES
MOTOR CONTROLS • APPLIANCE SWITCHES

NOW

. . . a complete line of
OIL TIGHT PUSH BUTTONS
and PILOT DEVICES

FEATURING EXCLUSIVE "TURN-TO-TEST" ILLUMINATED PUSH BUTTON!

1. *TURN* BUTTON TO TEST LAMP FOR FAILURE.
2. PILOT LIGHTS IF LAMP IS OPERATIVE.
3. *PUSH* BUTTON TO START, WITH FULL ASSURANCE PILOT WILL GIVE A TRUE INDICATION!

Satisfy Every Control Need . . . with this complete line that includes: Standard, Mushroom, Extended, Metal and Lock-Type Buttons; Pilot Lights; Standard and Lock-Type 2- and 3-Position Selector Switches; and variations, modifications and accessories to meet individual needs.

Meet Highest Performance Standards . . . push button and pilot devices all interchangeably mounted, are sturdily constructed from quality materials and deliver long life and dependable operation on the toughest, heavy-duty industrial applications.

Write today for complete information on these A-H Oil Tight Push Buttons . . . and also on our standard Duty and Heavy Duty Push Button Lines. The Arrow-Hart & Hegeman Electric Company, Dept. ECM, 103 Hawthorn St., Hartford 6, Conn.

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Quality since 1890

MOTOR CONTROLS • ENCLOSED SWITCHES
APPLIANCE SWITCHES • WIRING DEVICES

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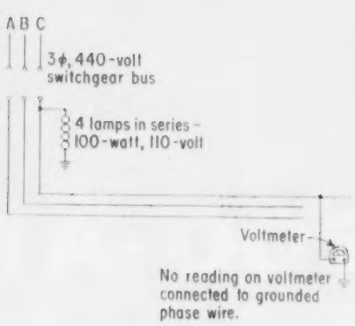

A B C
3φ, 440-volt switchgear bus
4 lamps in series – 100-watt, 110-volt
Voltmeter
No reading on voltmeter connected to grounded phase wire.

IDENTIFYING PHASES
OF 3φ UNGROUNDED CIRCUIT

TEST METHOD used to phase-out unidentified conductors of a sprawling 3-phase, 440-volt, ungrounded distribution system.

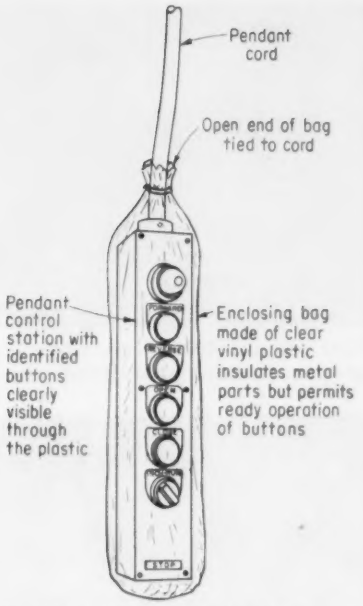
this phase throughout the plant. A voltmeter connected between this conductor and ground anywhere in the plant would give little or no reading. The lamps did not light up. At predetermined check points, this conducter (showing no reading) could be permanently tagged Phase C (see diagram) or otherwise coded to correspond to phase identification at the switchgear.

The same procedure was repeated on each of the other two conductors of the circuit with each conductor being tagged as tested for phase identification.

Plastic Jacket Waterproofs Switch

Chemical plants, breweries, plating works, and laundries are locations that are prone to develop trouble from moisture infiltration and corrosion to the electrical equipment installed. A frequent source of shocks to operating personnel in such locations is the common pendant switch station used with overhead cranes, boom cranes and fixed electric hoists. Even the best of switches used with rubber grommets about each control button and a ground wire attached to the switch frame can develop hazardous leakage current. The use of rubber gloves has proved an effective device against shock hazard; but their use is often neglected and the cause of the trouble is then not eliminated.

The solution to the hazard problem is to keep such switches dry. This can be achieved by cutting a sheet of 2-mil thick clear vinyl plastic to size, then sealing off the bottom to form a bag, and slipping this bag over the pendant switch assembly. The open end may be


Pendant cord
Open end of bag tied to cord
Pendant control station with identified buttons clearly visible through the plastic
Enclosing bag made of clear vinyl plastic insulates metal parts but permits ready operation of buttons

TYPICAL PENDANT SWITCH enclosed in a clear plastic bag to shield the assembly against moisture, dust and fumes—eliminating shock hazard and protecting the unit against malfunction due to corrosion or the presence of foreign material. The clear plastic permits ready identification of the various pushbuttons.

secured by several means such as waxed cord, tinned copper wire, or even strips of vinyl tied around the throat of the bag. The transparent plastic permits identifying the designations on the several buttons mounted in the switching sequence and serves to keep every thing securely dry and free from corrosive fumes and moisture.

One method of keeping corrosion destruction down to a minimum in control cabinets is to use electric heat developed through small heater elements or the use of old style carbon lamps located where needed to prevent accumulation of moisture.

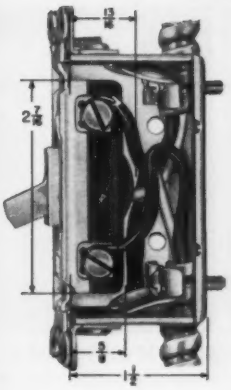
Special Vault for 33,000-Volt Substation In Industrial Plant

A new 33,000-volt electrical substation is now in operation at the Collegeville, Pa., plant of Superior Tube Company. The inside location permits future expansion of the physical plant in any direction without moving the substation to make room for new construction. The new electrical substation, which is located in the basement of Superior's large mill, doubles the

ARROW AH HART

Because of THIN-WALL CONSTRUCTION you asked for this NEW

ARROW-HART SPACE SAVER Quiette SWITCH



H&H SPECIFICATION GRADE

UL

No. 1101

15 amp.
120-277 volts, ac only

This comment is typical of many received upon the introduction of Arrow-Hart's exclusive SPACE-SAVER Quiette Switch. Here's why . . .

"This has been needed for a long time... space-wise as well as price-wise!"

EXTREMELY SHALLOW BASE . . .
only ⅝" from face to back. FITS 1¼" BOX.

GREATER WIRING ROOM . . .
making wiring easier, faster.

TWO WIRE ANCHOR HOLES . . .
at each binding screw for holding wire when looping around binding screw.

BIG BINDING SCREWS . . .
with deep-cut slots, for gripping wire firmly, assuring permanent holding and strong, positive connections.

QUIET, MECHANICAL ACTION

AVAILABLE IN BROWN OR IVORYLITE

FOR FULL INFORMATION . . . on the new Arrow-Hart Space-Saver Quiette Switch and the complete line of Arrow-Hart Quiette Switches, write to Dept ECM, The Arrow-Hart & Hegeman Electric Co., 103 Hawthorn St., Hartford 6, Conn.

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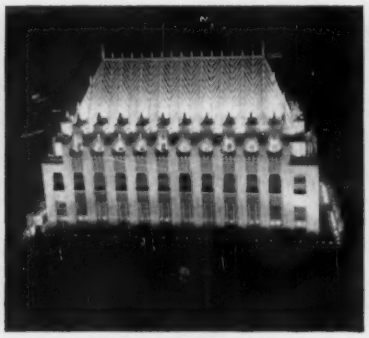
Quality since 1890

WIRING DEVICES · ENCLOSED SWITCHES
APPLIANCE SWITCHES · MOTOR CONTROLS

PERIMETER LIGHTING helps prevent trespassing and costly pilfering.

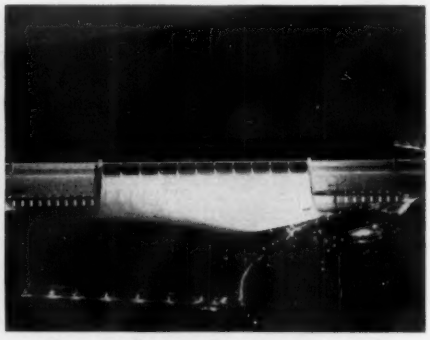


ARCHITECTURAL LIGHTING will add prestige and beauty to buildings.

SHOPPING CENTERS boost night-time business when brightly lighted.

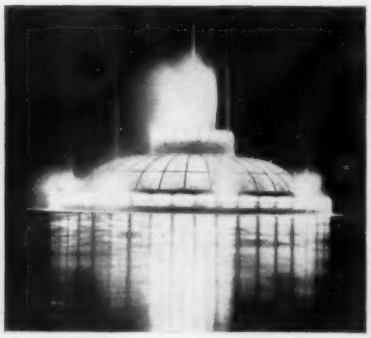
LOADING DOCKS become safer, more efficient when properly lighted.

FACADE LIGHTING gives safety, identification to building and store fronts.



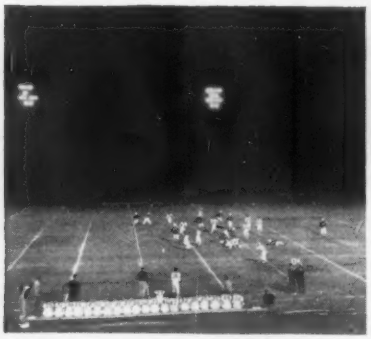
GRAND COULEE DAM lighted by 742 General Electric 1500-watt floodlights.

RAILROAD YARD lighting cuts accidents, thefts and costly freight damage.



FOUNTAINS assume day-time beauty with brilliant, multi-colored floodlights.

NIGHT CONSTRUCTION is safer and more practical with floodlighting.



ATHLETIC FIELD lighting lengthens the time available for fun and play.

DOCK FACILITIES nighttime usage is greatly increased with floodlights.

TENNIS COURTS attain round-the-clock use with modern floodlighting.

STORAGE YARDS can be just as accessible at night as they are by day.

PLANT ENTRANCES need modern lighting to facilitate visitor checking.

GUIDE SIGN lighting adds convenience, safety to highway travel.

AIRPORTS become safer, and more convenient with proper floodlighting.

When light means more safety, fun, beauty, or efficiency, General Electric floodlights will do it best—at least cost

As floodlights in these 16 areas are switched on there is an immediate addition of beauty, safety, efficiency. Nighttime crowds fill the lighted recreational areas; movement of raw materials and finished goods is speeded on lighted loading docks; a fountain with multi-colored lights becomes a nighttime landmark.

These are typical results of proper outdoor lighting. The benefits are many—the applications unlimited. But, regardless of the job to be done—from Grand Coulee Dam to highway guide signs, from Milwaukee's County Stadium to railroad yards—General Electric has experience to do the job best . . . and a full line of floodlights to do it at least cost:

FILAMENT OR MERCURY LIGHTING is simple with any of General Electric's L-69A (high efficiency), L-80 (heavy-duty enclosed), or L-55 (economy open-type) units. Each of these floodlights features G.E.'s exclusive "diamond back" reflector . . . designed to deliver from 5% to 35% more light . . . and distribute it more uniformly.

FLUORESCENT LIGHTING units are available in 4-, 6-, and 8-foot lengths. Two housings are offered—one for G.E.'s High Output lamps—the other for G.E.'s Power Groove lamps.

Here's an added benefit—over 500 conveniently located distributors are ready to supply General Electric floodlights and technical aid for your installation. Call your nearest distributor—ask for General Electric's *new* Floodlighting bulletin with descriptions, application information, and product data on the complete line. G-E Easy Lighting Layouts are also available for most floodlighting applications. Use the coupon below if you don't know the distributor in your area.

Progress Is Our Most Important Product

GENERAL ELECTRIC

General Electric Company, Section C460-04, Schenectady 5, N. Y.

Please send me free floodlighting information as indicated below:

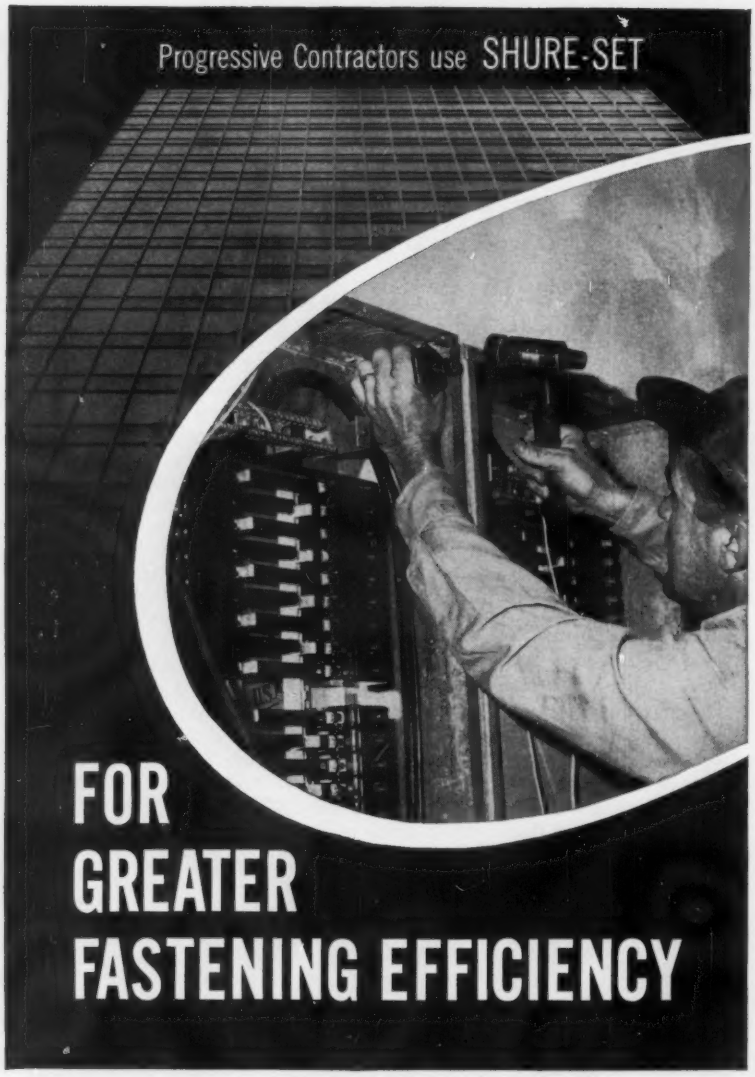
☐ Floodlighting—Bulletin GEA-7201

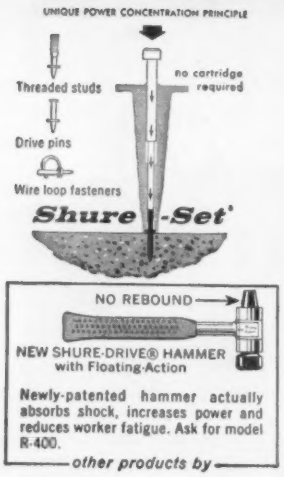
☐ Easy Lighting Layout for _____ Application

Name _____

Street _____

City _____ State _____




UNIQUE POWER CONCENTRATION PRINCIPLE
Threaded studs
Drive pins
Wire loop fasteners
no cartridge required
Shure-Set
NO REBOUND
NEW SHURE-DRIVE® HAMMER with Floating-Action
Newly-patented hammer actually absorbs shock, increases power and reduces worker fatigue. Ask for model R-400.
other products by

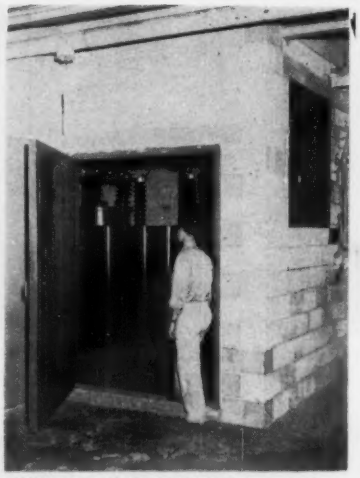
Simple–quick–safe–economical...these are a few of the reasons for the rapid acceptance of Shure-Set by electrical contractors everywhere! They have found the Shure-Set hammer-in system is an ideal way to set threaded studs, drive pins or wire loop fasteners through wood or thin metal into concrete with very little effort or expense.

Shure-Set requires no cartridge—a few hammer strokes do the job—from fastening raceways and panels to securing conduit clips and junction boxes, all without drilling or plugging!

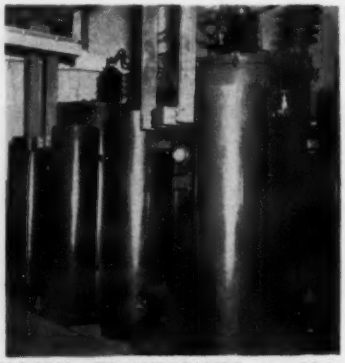
It makes good sense to use Shure-Set wherever you need truly economical, dependable fastening. Get the money-saving details on all electrical applications from your Ramset dealer (under "Tools" in Yellow Pages) or write us direct.

Ramset® Fastening System

OLIN MATHIESON — WINCHESTER-WESTERN DIVISION
285-I Winchester Ave. • New Haven 4, Conn.



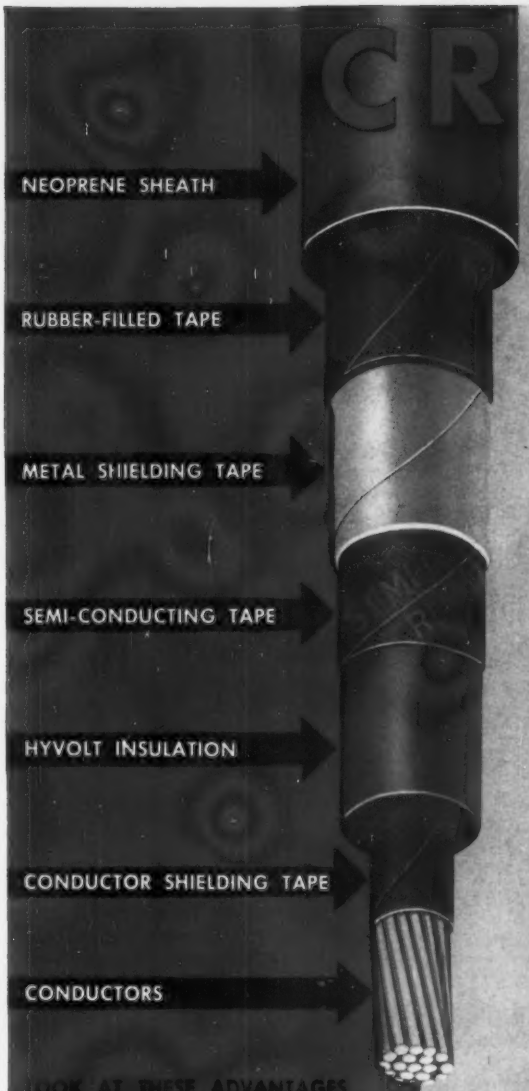
CONCRETE-BLOCK VAULT houses three transformers for 33,000-volt indoor substation. Air for effective ventilation is drawn through the grilled opening in the vault wall, at right. The air passes over the transformers, carrying heat out through an opening in the opposite wall. If fire should start in the vault, metal slats inside the grilled opening close automatically and cut off the air supply to the fire.



500-KVA TRANSFORMERS in 33-kv vault are liquid-cooled units, set as shown. The National Electrical Code requires use of a vault for any transformer —oil-filled, askarel-filled or dry type— when the unit operates at more than 15,000 volts. Central location of the vault facilitates expansion of the plant in any direction from this load center.

plant's transformer capacity. Both it and Superior's first substation, located outdoors on the west side of the plant, have three 500-kva transformers. The new substation has an indoor ACB drawout-type switchgear to distribute power to various parts of the plant.

Installing the substation indoors required special safety measures. The wires from the 33,000-volt primary line were sheathed in lead and brought underground into the basement location. Ewald and Miller Consulting Engineers did the de-



CRESCENT

HYVOLT SHIELDED POWER CABLE

Gives More Amperes Per Dollar of Installed Cost

CRESCENT HYVOLT insulation is made from butyl rubber which is inherently resistant to ozone, heat, moisture and aging. HYVOLT is formulated and processed so as to retain these inherent characteristics of the butyl rubber and at the same time provide excellent electrical and physical properties.

The insulation is protected during and after installation by an outer neoprene sheath providing a maximum degree of toughness, durability and long life. It is flame retarding and resistant to the deteriorating effects of moisture, sunlight, ozone (corona), oil, grease, and many acids and alkalies.

HYVOLT Shielding provides additional internal and external protection in these THREE WAYS

1 Conductor shielding, as provided by a semi-conducting tape over the stranded conductors, excludes air pockets between conductor and insulation and eliminates possible internal corona-cutting of the insulation.

2 The semi-conducting tape between the insulation and metallic shielding tape prevents possible ionization of air spaces and corona at the insulation surface.

3 The metallic shielding tape is grounded when installed, resulting in zero potential to ground at the sheath. It prevents surface discharge or burning, and protects cable from lightning surges. Reduces shock hazard.

RECOMMENDATIONS

CRESCENT SHIELDED HYVOLT CABLE is recommended for use in conduits, underground ducts, in wet or dry locations, or buried directly in the ground, for circuits operated at over 3000 volts and in accordance with I.P.C.E.A. recommendations. Available in single conductor or multi-conductor cables.

Specify CRESCENT SHIELDED HYVOLT POWER CABLE for general power circuits and where severe conditions are prevalent such as chemical plants, refineries, paper mills, mines, sewage disposal plants, etc. It is approved as Airport Lighting Cable Type B, CAA Specification L-824.

LOOK AT THESE ADVANTAGES

1. Long life.
2. Can be operated at 85°C. Permits smaller conductors or more amperes per conductor.
3. Freedom from corona cutting.
4. Excellent resistance to moisture.
5. Low power factor and dielectric loss.
6. Lighter, more flexible, easier to handle and install than lead covered cables.
7. Electrolytic or chemical corrosion of lead sheath is eliminated by use of neoprene sheath.
8. Shielding prevents possibility of surface burning and provides safety to human life.

CRESCENT INSULATED WIRE & CABLE CO., INC.

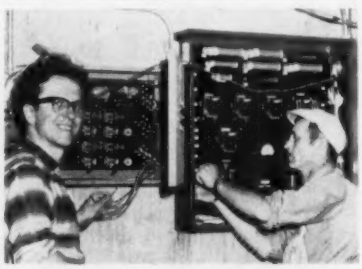
TRENTON, NEW JERSEY

sign work on the new substation. Philadelphia Electric Company provided technical assistance to the local electrical contractor—J. F. Davis of Valley Forge, Pa.—in making the underground cable installation. The most difficult problem was to provide ventilation to cool the transformers while making provisions to contain and put out transformer fires should they occur.

Superior's engineering department designed and built a special concrete-block vault to house the three transformers. Cooling air flows into the vault through a screened opening in one wall, over the transformers and through a duct opening in the opposite wall and then to the roof. For fire protection, heavy metal slats, resembling a Venetian blind, are installed inside the opening through which the air enters. They are held open with a chain, one link of which is made from metal with a low melting point. If fire breaks out, the link instantly melts, and the metal slats close to seal off the opening. With the air supply cut off the fire quickly dies out. The new substation installation has been approved both by the Philadelphia Electric Company and the Factory Mutual Fire Insurance Companies.

Correction

On page 114 of the August issue a sketch showing the use of a clamp type ammeter to locate conductors in a trough is in error. The method is effective only when one circuit conductor is included in the group checked. No reading would be obtained if both conductors of the circuit were enclosed in the meter clamp as shown. To avoid this possibility the trough might be used as the grounded conductor of the test circuit. Thanks to J. V. De Armond of South Gate, Calif., who called this to our attention.



MAKING CONNECTIONS for contractors Wismer & Becker of Sacramento, Calif., are electricians Friedrick Woehr and Ray White, here pictured at a sprinkler and fire alarm panel located in the new $6-million Sheraton hotel in Portland, Ore.

Photo courtesy of Western Electric Co.
Architects & Engineers: Lockwood Greene

This is *PRACTICAL* MAINTENANCE . . . WITH *Servisafe* POLES

In less than 10 minutes, this man will have finished replacing a burn-out and cleaning a luminaire. It's a fast, efficient, no sweat job. He is free from climbing hazards, and the lowered fixture is dead. In addition, his only "auxiliary" equipment is a detachable handline!

The unique advantages of Thompson "Servisafe" Metal Poles assure year-round all-weather lighting maintenance at minimum cost. In fact, there is no easier, safer or more economical method of servicing pole-mounted luminaires.

FOR DETAILS AND PRICES, WRITE FOR BULLETIN PWB-59. 2314-TE

T-E

THE THOMPSON ELECTRIC CO.

P. O. BOX 873-D • CLEVELAND 22, OHIO

Red Throat
BM-21B
½" Connector
BM-22B
¾" Connector
BM-23B
1" Connector

BM-41
½" Coupling
BM-42
¾" Coupling
BM-43
1" Coupling

BM-51
½" Offset Connector
BM-52
¾" Offset Connector

BM Offset Connectors showing how wires are guided over box edge.

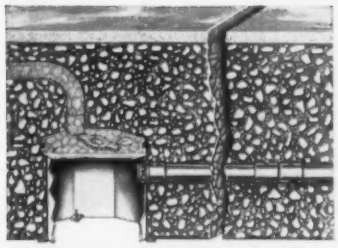
SAVE IN SIXTY

Save time and money with

B-M ORIGINAL INDENTER FITTINGS

Here is the combination that is unbeatable when it comes to easier E.M.T. installation at less cost. New lightweight plier size indenters make setting up thin wall conduit a breeze. B-M fittings are neater too! No unsightly nuts or projecting set screws.

A few more of the plus features of B-M fittings are Concrete tight—Vibration resistant—Extra heavy bright zinc plate, salt spray and acid drip tested for corrosion resistance—Extra heavy positive bonding locknuts—smooth rounded edges or bushed throat type connectors that prevent insulation damage—All steel construction with extra heavy gauge wall thickness.



ALL BRIEGEL FITTINGS ARE U. L. APPROVED AS CONCRETE-TIGHT

When setting E.M.T. in concrete you can make each job easier and more profitable by using Briegel All Steel Indenter Fittings that have UL approval as Concrete-Tight. Contractors everywhere recognize their cost cutting qualities and the fact that they make each wiring job a better job. It is only natural that Briegel Fittings are the most widely used E.M.T. connectors and couplings.

BM PLIER SIZE INDENTERS
BM—No. 607 ½"
BM—No. 608 ¾"
BM—No. 609 1"

All B-M indenter type fittings far exceed the requirements of U. L. file card E 10863 and Federal Specifications W-F-406.

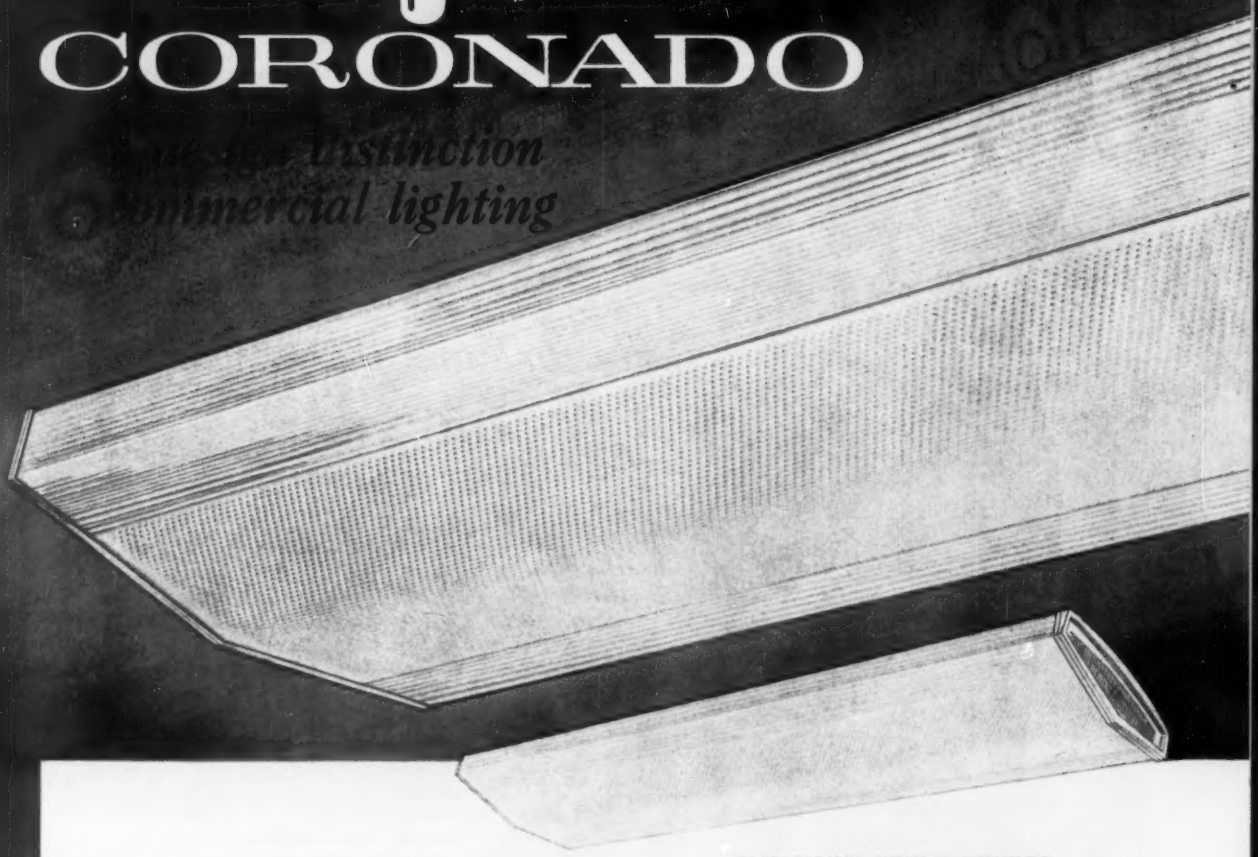
BRIEGEL METHOD TOOL CO.
GALVA • ILLINOIS

USED THE MOST FROM COAST TO COAST

Introducing the elegant... slim, trim

BENJAMIN CORONADO

...distinction ...commercial lighting



Now . . . Benjamin introduces the ultimate in dramatic fluorescent lighting—the slim trim Coronado. It's excitingly different, with the smart, slender look of distinction. Available in either a clear or "Prisopal"® lens, the Coronado hugs the ceiling in perfect harmony of design, with a visible depth of only 2½". Its distinctive styling sets this unit apart from all other plastic enclosed units.

The Coronado leads the field in practicality, too. *One-piece diffusing element . . . finger-touch latch . . . built-in coupler . . . snap-in wiring channel*—all add up to the easiest installation and maintenance ever. The Coronado combines beauty with new features and dollar savings in a way that assures complete satisfaction, whether used for appearance or price.

Available in 2 or 4 lamp—40 W. Rapid Start

EXCLUSIVE NEW FEATURES

NEW . . . finger-touch latch hinges from either side, allows basket to swing down or be removed—no tools needed.

NEW . . . snap-in wire way cover provides easy access to wiring and control equipment.

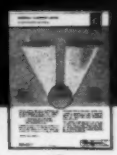
NEW . . . end plate design permits easiest tandem installation, coupling units in perfect alignment.

NEW . . . decorative plastic end caps available for use on individual units or at ends of row.

NEW . . . one-piece "wrap-around" extruded plastic construction—only 2½" visible depth.

NEW

3-in-1 light diffuser in a surface mounted unit

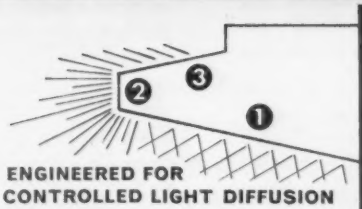


CORONADO—CLEAR LENS (Top)

This new 3-in-1 diffuser boasts a crystal-clear L-120 low-brightness prismatic bottom, complemented by linear refracting lenses on sides and top to redirect light out of glare zone. Here is the ultimate in clear, color-stabilized polystyrene.

CORONADO—PRISOPAL® LENS (Bottom)

With the addition of opalescent white, this totally new 3-in-1 diffuser becomes a beautiful diffusing surface offering something new in controlled illumination.



ENGINEERED FOR CONTROLLED LIGHT DIFFUSION

1 Low-brightness L-120 prismatic lens on bottom for superior performance and control.

2 Refracting linear lens on sides redirects light out of the glare zone, effectively controls side brightness.

3 Refracting linear lens on top increases efficiency, spreads light uniformly over ceiling, banishes "hot spots."

For full information on the new Benjamin Coronado, mail coupon to Benjamin Division Thomas Industries Inc., 207 East Broadway, Louisville 2, Ky., Dept. BECM-9

BENJAMIN DIVISION

THOMAS INDUSTRIES INC.

The World's Largest Single Source of Lighting for Commerce, Industry and Home.

Send FREE copy of Coronado Folder to:

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

NAME_____

SORGEL'S SPECIALIZATION

assures Quiet Quality dry-type transformer performance that's the finest in the industry

Since 1916 the principal products at Sorgel Electric Company have been dry-type transformers. Because of this long-time pioneering, specialization and experienced engineering, Sorgel customers are assured of continuous, more dependable transformer performance.

The Quiet Quality of Sorgel dry-type transformers provide the highest efficiency, which reduces operating costs. Sorgel specialization assures a product that requires little or no maintenance, and a design that's easy, more economical to install.

Imaginative progress has been, and is being, made every day at Sorgel. In all forms of modern electrical distribution the Sorgel product is your best buy in stepping down higher distribution voltage to utilization voltage for institutional, commercial and industrial buildings. Look for the Sorgel mark, and when you find it, you'll know this electrical installation was the first choice of a quality-conscious Consulting Engineer, Plant Engineer, Contractor or End-user who wanted to assure dependable, uninterrupted electrical distribution.

Complete Line for Every Purpose up to 10,000 Kva, up to 15,000 Volts, Including Special Transformers and Saturable Reactors

SORGEL ELECTRIC COMPANY

836 West National Ave., Milwaukee 4, Wisconsin

Sales engineers in principal cities. Consult the classified section of your telephone directory or communicate with our factory.

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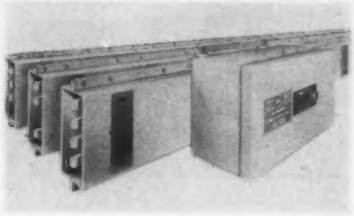
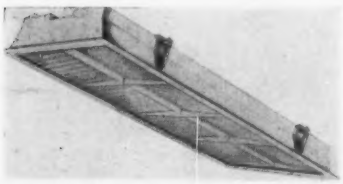
Product News



Busway (1)

A new packaged busway of 100-amp capacity, called "Speedbus," can be used wherever electric lighting and power are needed in commercial, institutional and industrial type buildings. Three- and 4-wire constructions are standard. A Speedbus system can be quickly relocated, rerouted or extended to meet any production line changes. It is made in pre-assembled sections of package 5- and 10-ft lengths ready to install, with 16 full-contact, polarized plug-in outlets in every 10-ft length. Outlets are spaced eight to each side of busway, back to back, and all 16 outlets can be used simultaneously. Eight plug-in outlets are incorporated into the 5-ft length.

National Electric Div., H. K. Porter Co., Inc., Porter Building, Pittsburgh, Pa.



Troffers (2)

A new line of recessed fluorescent troffers called Shallow line, featuring a wide variety of diffusing elements and an overall depth of 4⅞ in. Troffers are designed to provide greater structural freedom between floors by allowing plenum depth to be reduced. Features include one-piece diffusing elements, up to 8 sq ft of glass, lens or louver. Troffers are available for all popular ceiling types. The 14 basic types of shielding elements include Benjamin L-120 lens, Corning No. 70, Holophane Prismalume, Owens-Corning Fiberglas, ½ in. by ½ in. Polystyrene or aluminum louvers, a new drop-dish acrylic panel and parabolic low brightness aluminum.

Benjamin Division, Thomas Industries Inc., 207 E. Broadway, Louisville, Ky.

Limit Switch (3)

A new, heavy-duty lever limit switch is designed for mill and general industrial applications to give improved service on cranes, hoists, industrial conveyors and elevators. It may be used also as a pilot-circuit device to limit travel or setup functions at pre-determined positions. Available for either 2- or 4-circuit operation, it features a smaller, lighter enclosure. A choice of general purpose, weatherproof, watertight, or dust-tight enclosures of NEMA Types 1, 3, 4 or 5. Switches may be either base- or side-wall mounted.

General Electric Co., Schenectady 5, N. Y.

Receptacle (4)

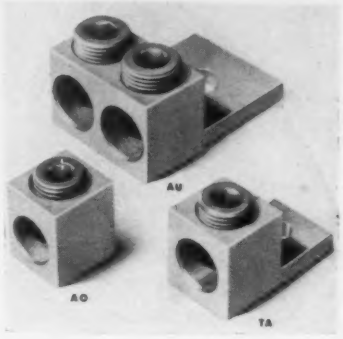
An all new pendant-type explosion-proof receptacle, known as "CPSHC," has been specifically designed for ceiling mounting. All arcing, if any, is confined within a plug combustion chamber of the dead-end receptacle. They have UL approval for Class I, Groups C and D. Receptacles have been designed for use with type "CPP" explosion-proof plugs. "CPSHC" pendant receptacles are made of polished aluminum. They have a ½-in. hub with set screw and are rated at 20 amps, 1 hp, 115 or 230 volts, 60 cycle, ac, single phase and 2-wire, 3-pole circuit.

Appleton Electric Co., 1701 Wellington Ave., Chicago 13, Ill.

Support Clamp (5)

Type S clamp supports periscope service pipes, hanging electric signs, etc. Fits 1¼-in., 1½-in. and 2-in. pipe. Clamp can be used with guy wires. Complete unit with ¾-in. pipe sockets and hinges designed for use with ¾-in. supporting pipe braces. Made from heavy-gauge steel and zinc galvanized.

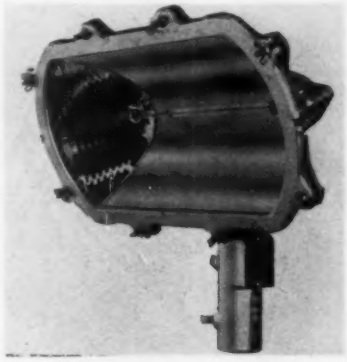
Ramco Manufacturing Co., 540 Westfield Ave. W., Roselle Park, N. J.



Connectors (6)

Complete lines of new aluminum connectors that include lugs for single and double cables up to 600 MCM; box style lugs up to 600 MCM; and switchgear lugs with two mounting holes up to 1500 MCM. Fabricated from high-strength 6061-T6 aluminum structural alloy, these lugs are electro-tin plated, assuring high tensile yield strength, resistance to corrosion and high electrical conductivity.

Ilsco Corp., 4730 Madison Rd., Cincinnati 27, Ohio



Floodlight (7)

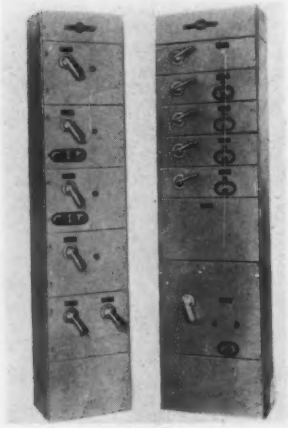
A new floodlight with a vertical beam spread of 8° and horizontal beam spread of 100° is called Wide-Lite Lumitor. The quartz-iodine lamp life is rated at 2,000 hours. It has a mean efficiency of 22 lumens throughout its life. Applications for the Lumitor include decorative lighting of tall buildings from near the base of the wall and lighting for stadiums, golf driving ranges, signs, billboards, airport runways, and marine uses. Available in 500- and 1500-watt models. Both models mount on 1¼-in. pipe masts.

Wide-Lite Corporation, Box 191, Houston, Texas

Heat-Light-Fan Unit (8)

New combination heater, light, ventilating fan unit for use in bathrooms. Model 5412 includes a 3-way switch plate, completely prewired; made up of a polished aluminum control panel, three separate switches to actuate blower, light and heater; and a red pilot light tied in series to the heater and fan. Balanced lighting is provided by two lamp sockets. A 1320-watt, 4500-5000 Btu heating element has a built-in safety switch to prevent overheating. Unit is easily installed in any home, between standard joists. Literature is available.

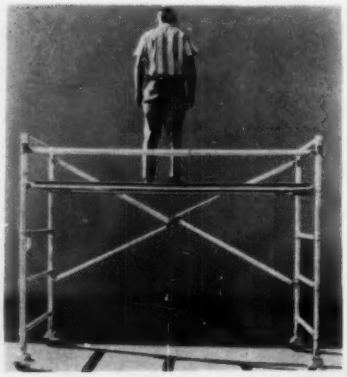
Leigh Building Products, Div. of Air Control Products, Inc., Coopersville, Mich.



Control Centers (9)

New Type "MC" motor control centers offer up to ten NEMA Size 1 control cells in a single vertical section 90 in. high. Centers will be supplied in two types differing in cubicle size. Type MC-5 will be for most general purpose industrial applications, provides up to 5 Size 1 control cells in a single cabinet 20 in. wide and 90 in. high. Type MC-10 provides up to 10 Size 1 cells in a cabinet 25 in. wide and 90 in. high and will be for commercial and institutional applications. Each control cell normally houses a combination starter unit. Included are: reversing, non-reversing, 2-speed, part-winding, and reduced voltage starters in NEMA Size 1 through 5, in combination with fuses or unfused disconnect switch or circuit breaker of thermal magnetic or instantaneous trip type.

Arrow-Hart & Hegeman Electric Co., Hartford, Conn.



Scaffold (10)

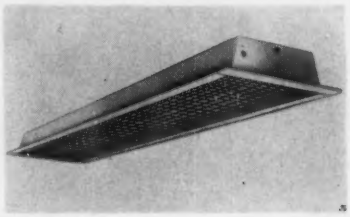
New one-piece aluminum scaffold on wheels unfolds in seconds. Two folding V braces snap together and lock automatically. The scaffold, 10 ft long and 29 in. wide, rolls through doorways and narrow aisles. Platform height is adjustable from 1 ft to 8½ ft. Casters lock automatically; legs are instantly adjustable for uneven floors and stairways. It is dimensionally interchangeable with standard Up-Right span type scaffolds.

Up-Right Scaffolds, 1013 Pardee, Berkeley, Calif.

Cable (11)

New plastic-jacketed non-metallic sheathed cable, called Thermo-Triex, has been announced. The individual conductors will continue to be insulated with a polyvinyl-chloride compound and color coded according to standard industry practice. The outer covering will also consist of a special polyvinyl-chloride compound which is designed not to deteriorate. This new outer covering for non-metallic sheathed cable is resistant to flame, impact, oil, alkalis and acids. It is free stripping, bright and smooth.

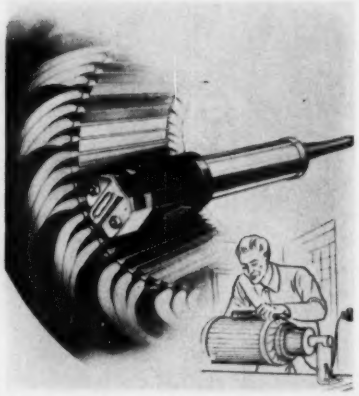
Triangle Conduit & Cable Co., Inc., Triangle and Jersey Aves., New Brunswick, N. J.



Troffer (12)

A redesigned troffer line, known as the Aurora Compact, is 3½ in. in depth and features a thin socket plate mounted on end panel. It is available in 1 by 4 and 2 by 4 rapid start units for lay-in or flange-type installations. Choice of four diffusers: aluminum or plastic egg-crate, inverted hexagonal, prismatic "Starlite" lens, or the new polystyrene diffuser.

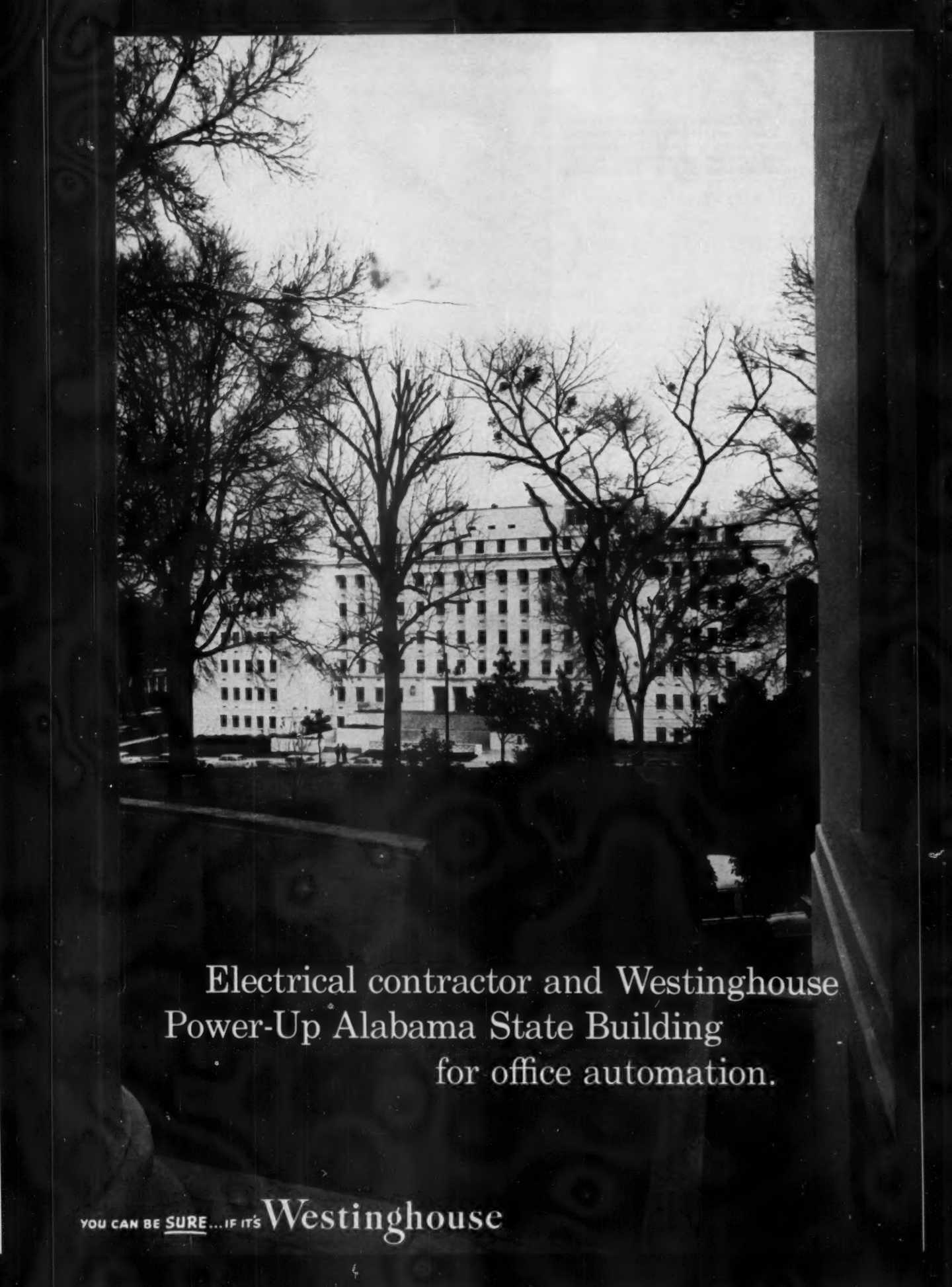
Metalcraft Products Co., Inc., 6225 State Road, Philadelphia 35, Pa.



Motor Tester (13)

A new electric hand tester provides quick and sensitive indication of faults in motor stators and rotors. The unit is used to check winding slots and employs an indicator lamp to reveal faults. Sensitivity with this lamp is much greater than it could be with an audible signal. Unit will readily indicate the short-circuiting of a single turn in a winding, and its strong inductance provides reliable testing of the largest motors. Operating on ac or dc, from 105 up to 240 volts, this tester checks single-phase and 3-phase rotors and stators for shorts, checks slip rings for shorts, and checks dc armatures for winding and commutator faults, for wrong connections, and for opens.

August Schoenenberg Inc., 1267 W. Laurelton Pkwy, West Englewood, N. J.


Electrical contractor and Westinghouse
Power-Up Alabama State Building
for office automation.
YOU CAN BE SURE... IF IT'S Westinghouse

COVER PHOTO

Newest facade on Alabama's Capitol Hill is the seven-story, 258,500-square-foot State Administration Building shown on cover. The building houses 17 state agencies, will eventually be the "working home" for more than 1100 Alabamians.

New State Administration Building is geared for latest "office automation" techniques like data processing area *(at right)* which handles a steady flow of facts and figures. Westinghouse Type SC fluorescent luminaires, ceiling mounted for fast installation, provide an attractive and cheerful work area for state employes.

Teamwork paid off for the new Alabama State Administration Building. Careful evaluation of all building functions, sound planning and careful coordination produced a modern electrical distribution system—installed on time—that's ready to meet all present demands, anticipates future needs. Tandy Little, Jr. *(center)*, partner T. D. Little Electric Co., reviews specifications with O. E. Hatcher, Westinghouse Area Sales Manager; H. D. Mosley, Mosley and Yarbrough, Consulting Engineers; F. J. Sarknas, Westinghouse Construction Sales Engineer; R. F. Kirkpatrick, Sales Engineer, Moore-Handley Hardware Co.; and C. H. McCauley, Architect.

J-94141-2

Planning, coordination and Westinghouse on-time delivery mean installation efficiency for electrical contractor

On the campus-like grounds around its gracious Capitol, the State of Alabama has erected a modern State Administration Building, reflecting Alabama's progressive outlook. In this newest addition to the Capitol buildings, data processing machines handle quarterly income tax notices, automobile registrations, numerous statistical reports, sales tax, etc. As many as 38 machines and other electrical equipment operate during one shift in one department alone . . . office automation that requires reliable power in large demands.

The electrical contractor, T. D. Little Electric Co., teamed up with consulting engineers, experienced Westinghouse engineers and the Westinghouse distributor to work closely with state officials, the architect and general contractor on system installation. Result: an electrical system carefully planned and executed to distribute efficiently the big power load . . . a system with expansion capability to keep the building modern for years to come . . . a system installed at a "saving" in direct comparison to other buildings on the "campus."

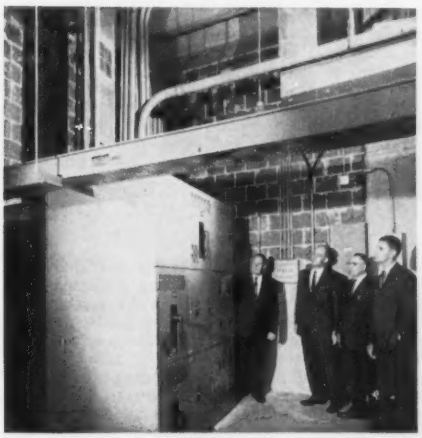
The electrical installation went off on schedule with building construction because of contractor-Westinghouse coordination and on-time deliveries by the Westinghouse distributor, Moore-Handley Hardware Co.

Westinghouse electrical equipment — reliable, adaptable and easy to install—was used throughout the building.

Included are a building-type switchboard, motor control center, distribution and lighting panelboards, low-impedance bus duct, circuit breakers, safety switches and fluorescent lighting. *(cont.)*

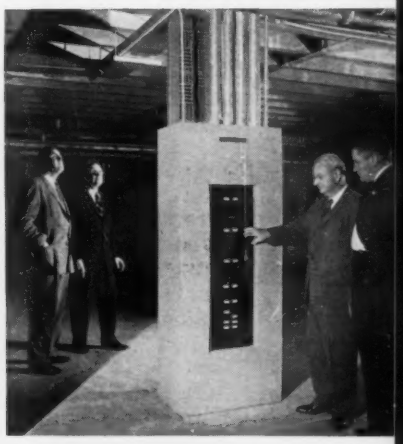
YOU CAN BE SURE...IF IT'S Westinghouse

J-94141-3

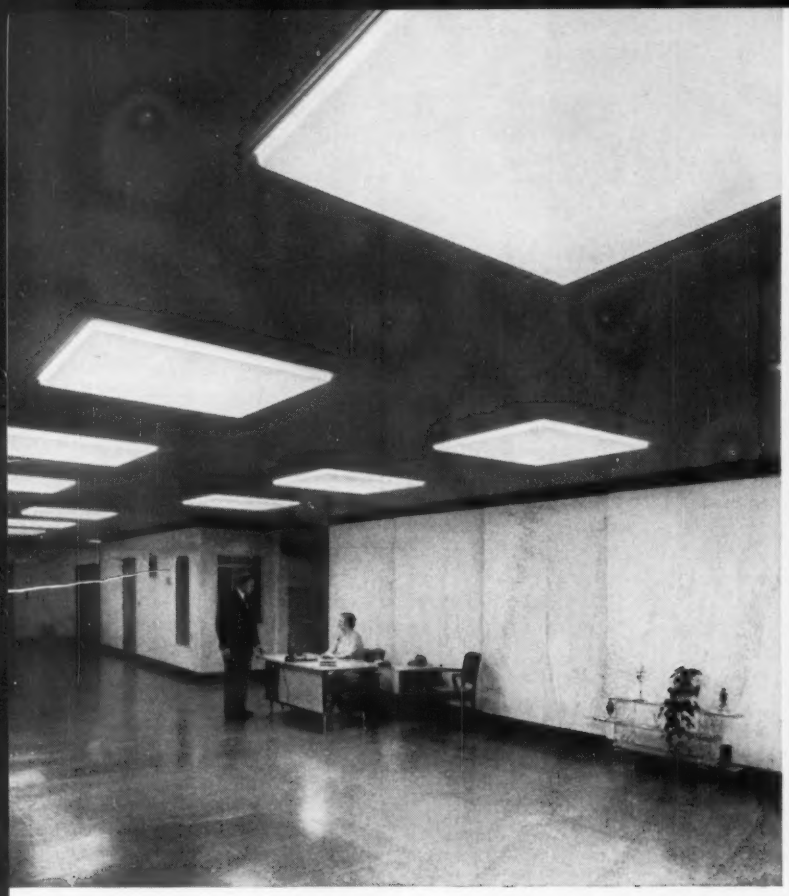


A 120/208-volt Westinghouse building-type switchboard protects and distributes power to all floors. Note blank sections for future system growth. Ventilated low-impedance bus duct, rated 3000 amps, conducts incoming power to switchboard from a bank of three 250-kva, Type SL, oil-insulated transformers. Mills Cowling, Chief of Service Division, State of Alabama; W. C. Sparks, Vice President, Moore-Handley Hardware Co., Westinghouse Distributor; T. D. Little, Sr., T. D. Little Electric Co., Electrical Contractors; and F. J. Sarknas examine future expansion features designed into switchboard.

Exhaust fan, elevator, air conditioning compressor, water pump and air handling equipment motors are served by a 480-volt Westinghouse motor control center which consists of Class 11-206 motor starters. Motor control center receives power supply from transformer vault by 1350-amp, low-impedance bus duct with many time-saving installation features. H. D. Mosley; O. E. Hatcher; William Lawrence, Jr., Deputy Director of Technical Staff, Alabama Building Commission; and C. H. McCauley inspect compact, efficient installation.



Westinghouse 1000-amp low-impedance ventilated bus duct efficiently distributes power to Westinghouse Type CDP distribution panelboard from distant switchboard with minimum voltage drop. H. D. Mosley and H. H. Houk, Director of Technical Staff, Alabama Building Commission, check neat bus duct installation as C. H. McCauley and O. E. Hatcher review circuit breaker arrangements in panelboard.



Alabama marble and Westinghouse Mainliner fluorescent fixtures combine to form an attractive welcome for employes and visitors in new Alabama State Administration Building. Westinghouse Mainliner large area luminaires have universal ease of application with installation flexibility. *Above,* R. F. Kirkpatrick points out details of Westinghouse lighting panelboard, Type NLAB, 120/208 v, to G. D. Schnell, member of the maintenance staff. Circuit breaker panelboards provide maximum circuit protection for Westinghouse Type SC fluorescent lighting luminaires used in corridors.

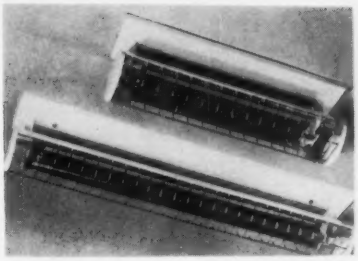
Planning, coordination and Westinghouse on-time delivery mean installation efficiency for electrical contractor *(cont.)*

Many outstanding electrical contractors have found Westinghouse equipment, coupled with localized Westinghouse service, the solution to power distribution system problems and a key way to increase installation efficiencies. Westinghouse can aid you in any phase of your electrical planning and construction. Call your Westinghouse distribution outlet or write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania. J-94141-4

OWNER: State of Alabama
ARCHITECT: Charles H. McCauley, Birmingham, Ala.
CONSULTING ENGINEER: Mosley and Yarbrough, Montgomery, Ala.
GENERAL CONTRACTOR: A. C. Sanford, Albany, Ga.
ELECTRICAL CONTRACTOR: T. D. Little Electric Co., Montgomery, Ala.
WESTINGHOUSE DISTRIBUTOR: Moore-Handley Hardware Co., Birmingham, Ala.

YOU CAN BE SURE...IF IT'S Westinghouse

Tandy Little, Jr., typifies progressive qualified electrical contractors who are helping America to Power-Up. He holds an electrical engineering degree and is president of Central Alabama Chapter of the National Electrical Contractors Association. A partner in T. D. Little Electric Co., he has responsibility for job management, contract negotiation, estimating and buying. His preplanning, business judgment and knowledge of currently available electrical products were big factors in the efficient electrification of the new Alabama government building.



Heater (14)

A unit heater for zone-controlled spot heating is called "Infra-Mite." Available initially in ten models, three sizes, 19½-in., 33-in. and 39-in. fixtures, there are semi-parabolic shaped reflectors and special end reflectors. Home owners and commercial users are offered a small-dimensioned heating fixture with an adaptability that allows it to attach to conduit box in an existing electrical system. Ceiling and wall mounted units are available, and a portable wall-hanging type, with cord. The 19½-in. fixture is available, 500- or 750-watt; the 33-in. model, 1000-, 1200- and 1450-watt; and the 39-in. unit, 2000-watt. Models are UL approved.

Apextro Products Co., Div. Apex Sheet Metal Works, Inc., 1821 *N. Eastlake Ave., Los Angeles* 31, *Calif.*

Truck Body (15)

New 1960 model Service-Master Body has been announced. Body is available in sizes for old or new ½, ¾, 1 and 1½-ton chassis, regardless of make. Model SM-10, 77 in. long at floor line, fits chassis having 40-in. to 42-in. cab-to-axle dimension; Model SM-15, 90 in. long, fits 48-in. to 54-in. CA chassis. Model SM-20, single rear wheels, and Model SM-30, dual rear wheels, are 102 in. long and fit chassis having 57 in. to 60 in. CA. An aerial ladder, available in two models and in 26- and 30-ft lengths, can be furnished with body. Model ML ladder is elevated by a manual hydraulic pump and Model LH ladder by a motor-driven pump powered by truck battery. Literature is available.

McCabe-Powers Body Co., 5900 *North Broadway, St. Louis* 15, *Mo.*

Voltage Regulator (16)

A new self-contained automatic voltage regulator called Unoreg, is for use on the low-voltage side of over 400 standard distribution transformers. Rated at 1½ kva, the device will handle distribution transformer sizes up to and including 25 kva. A lightweight design for convenient pole mounting, Unoreg provides plus and minus 5% regulation of 120/240-volt secondary lines. Unoreg consists of an induction regulator controlled by a solid-state voltage-regulating control. Induction regulator has a new stator design which eliminates the need for a tertiary winding. Midpoint voltage setting of regulator control is 122 volts, allowing for an average secondary drop of two volts. Control is designed so that voltage is always corrected back to center of bandwidth. Device is 21½ in. high and 12½ in. in diameter.

Westinghouse Electric Corp., Pittsburgh 30, *Pa.*

Ground Detectors (17)

A complete line of ground detectors has been developed for positive detecting of ground fault to prevent unscheduled shut-down and possible hazard, damage and expense. Model "VAP," 480 volts, is provided with an audible signal—an alarm bell that sounds when fault occurs. Signal may be silenced by acknowledge button. Acknowledge circuit is automatically reset when fault is corrected. A visual signal is also provided—a red fault light glows when fault occurs and remains lit until fault is corrected. A fault phase indication is also provided—white lights indicate which phase has gone to ground. A terminal block is provided for a remote alarm station with acknowledge button and/or indicating light.

Erickson Electrical Equipment Co., 4460 *N. Elston Ave., Chicago* 30, *Ill.*

Control (18)

The new Model 6801 photoelectric control adds flexibility to a time-switch lighting control system. Unit turns lights on during any period when natural light intensity falls below a set level and time switch continues to provide preset on and off periods regardless of natural light conditions. Any combination of turn-on and turn-off by time clock or photoelectric control is possible. The photocell unit, weather-sealed in an aluminum case for indoor or outdoor mounting, contains a broad area cadmium sulfide light-sensitive cell that is hermetically sealed. Unit is connected to indoor-mounted Model 6801 control box, containing a tubeless electronic circuit with a double-pole, single-throw load contactor capable of switching up to 6000 watts.

Fisher-Pierce Co., 51 *Pearl St., So. Braintree* 85, *Mass.*

Heaters (19)

Two new bathroom ceiling radiant Halo Heetaires install like fixtures—flush mounted to ceiling—to 3- or 4-in. junction boxes. Ready to attach to standard 60° house wire, the installer runs R, T, or TW wire directly into any 3 or 4-in. junction box. They are available in two models—The Fan-Glo Halo, models 294 and 295, in 1000 and 1250 watts, 120 volts; and Radiant Halo, model 298, in 660 watts, 120 volts. Both units may be used with a 60-minute wall timer. Literature is available.

Markel Electric Products, Inc. and La Salle Products, Inc., Buffalo, N. Y.

M. STEPHENS
MFG., INC.
814 EAST 29TH STREET
LOS ANGELES 11, CALIF.
ADams 1-9147

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(* Means rep. carrying stock)

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305 Velasco
Houston, Texas

Mr. W. A. Smith
Brenner Electrical Sales
P. O. Box 13001
Dallas 20, Texas

Mr. W. D. Reese
Brenner Electrical Sales
2608 Parkview Drive
Austin 5, Texas

*A. Lee Clifford & Co.
1801 W. 18th St.
Indianapolis 7, Ind.

Forrest E. Durnal
1121 Edgewater Ave.
Ft. Wayne, Ind.

Charles W. Pfeiffer
c/o A. Lee Clifford & Co.
1905 Bardstown Rd.
Louisville 5, Ky.

Bill Crichton & Associates
Riverview, Florida

Mr. C. R. Maddox
5601 Suwannee Ave.
Tampa, Florida

Mr. C. R. Stegin
2321 Riverside Ave.
Jacksonville, Fla.

Mr. J. R. Heidenreich
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Ft. Lauderdale, Fla.

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Howard Gregory
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Cincinnati 43, Ohio

Howard Flynn
11201 Frankstown
Pittsburgh 35, Pa.

*Hoffman Brothers
5201 Martin
Detroit 10, Mich.

*Keeler, White, Inc.
523 N.W. Everett St.
Portland 9, Ore.

*Keeler, White, Inc.
1041 - 6th Ave., So.
Seattle 4, Wash.

R. E. Myers & Son
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St. Louis 1, Mo.

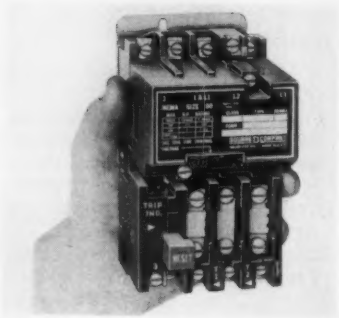
M. Morin Rivera
1300 N. Broad St.
New Orleans, La.

Electrical Sales Rocky Mountain
16 Wazee Market
Denver, Colorado

*Rouzer Sales Co.
823 Marshall St., N.E.
Minneapolis, Minn.

Leonard M. Slusser
318 Dooley Block
Salt Lake City, Utah

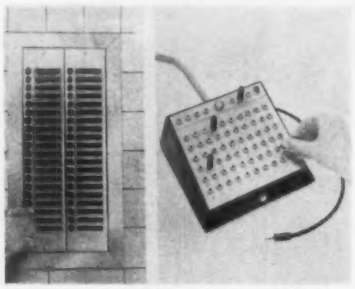
*Stanley Sales Corp.
1122 Folsom St.
San Francisco 3, Calif.



Starter (20)

New NEMA Size 00 starter has been developed for low-hp jobs. It is rated from ¾ hp 110 volts to 2 hp 440/550 volts for 3-phase service. Dimensions are 3⅛ by 5⅞ by 3⅝ in. Starter has straight-through wiring, pressure wire terminals, molded coil and one-piece melting alloy overload relays for complete motor protection. It is available either open or in a NEMA Type 1 enclosure with optional pushbutton or selector switch in cover. It also is available without overload relays. Bulletin SM-297 is available.

Square D Company, 4041 North Richards St., Milwaukee 12, Wis.



Paging System (21)

The Pagesaver system combines a control board with miniaturized in-and-out doctors' entrance registers. Operators, before paging, can interrogate their Pagesaver control board to determine whether or not a specific staff member has registered in. If a doctor has not come in, she can leave a message alert for both herself and the doctor by inserting a cordless alert plug into the control board. Entrance registers are of a new compact design which requires a minimum of wall space. Forty names require 9½ in. by 18 in. of wall space. Pagesaver systems can incorporate a number of entrance registers to provide access at secondary or remote hospital entrances.

Auth Electric Company, Inc., Long Island City, N. Y.

Switch (22)

The new "Two-Circuit Touchette" switch provides dim, medium and bright illumination at the touch of a button. Switch will carry 1800 watts at 120 volts, 4100 watts at 277 volts, thereby enabling single switch control of large banks of lights. At the first touch of switch button the first circuit makes contact providing dim light. At second touch the second circuit is activated providing brighter light. At third touch both circuits come into play providing full brightness. A fourth touch breaks contact completely on both circuits. Fluorescent fixture installations, cove and valance lighting for entire rooms may be controlled from one switch location.

Rodale Mfg. Co., Inc., 6th and Minor Sts., Emmaus, Pa.

Lighting Post (23)

A new all-aluminum residential lighting post designed specifically for use with the Holophane 431 luminaire. Post is available in 7- and 3-ft models, the former standing approximately 5½ ft above ground level. This model is for lighting driveways and housefronts. Smaller model standing 2 ft. above ground level is for patio and garden lighting.

Residential Lighting Div., Pfaff-Kendall, 84 Foundry St., Newark 5, N. J.

Motor (24)

New water-cooled, water-lubricated motors rated from 30 to 250 hp, 3 phase, 60 cycle, 1800 rpm, for 10-in. or larger well casings are now available. Motors are designed to be continuously submerged in water at a maximum temperature of 40°C for deep wells, booster or process applications. Motor frame is a heavy-walled, seamless-steel tubing. Epoxy coating provides protection against corrosion.

Westinghouse Electric Corp., Pittsburgh 30, Pa.

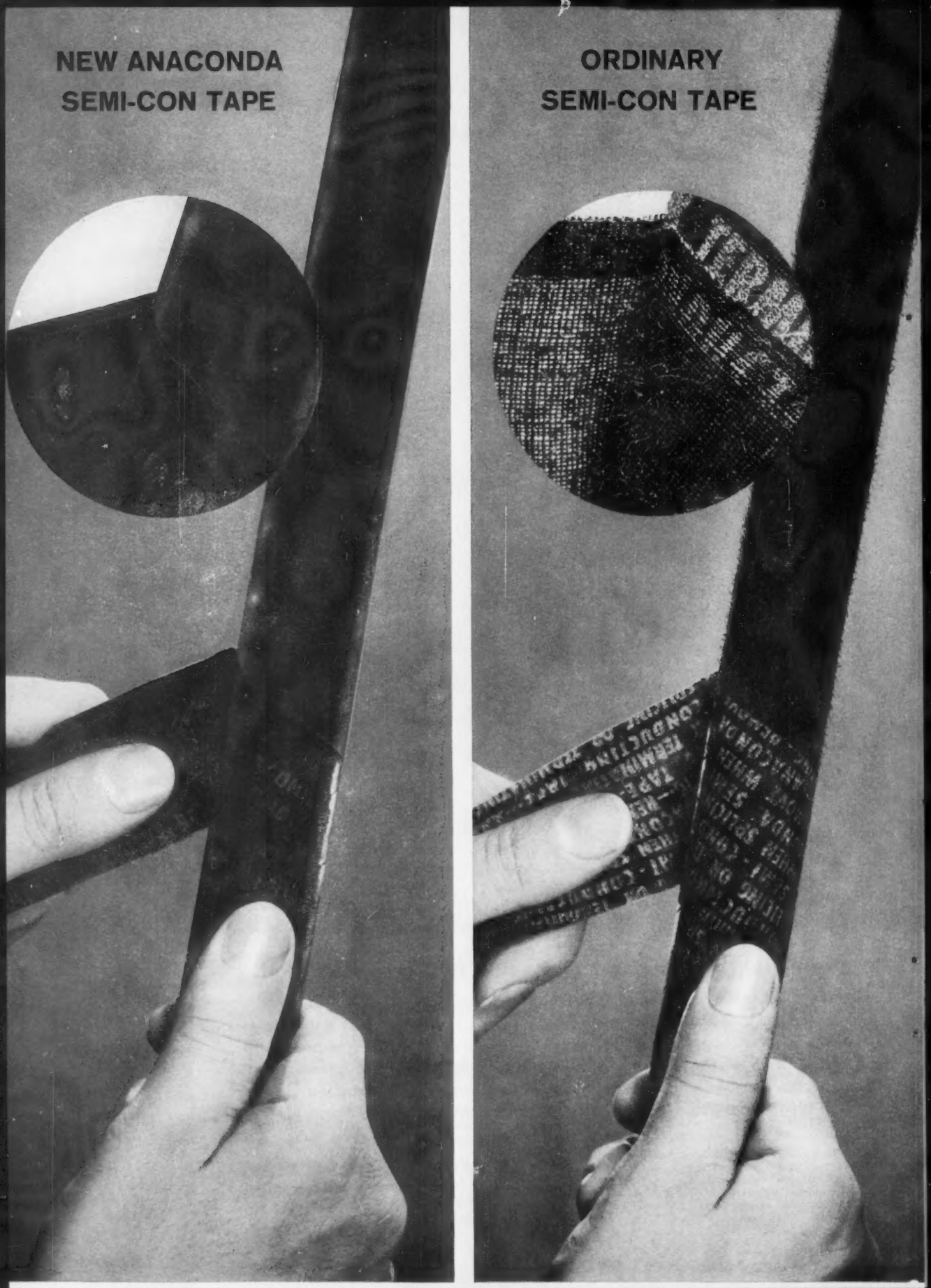
Flexible wiring system for Jacksonville City Hall with SPANG

Underfloor Duct and Headerduct. Three-duct runs of Underfloor Duct in concrete slab construction carry electrical, phone and intercom wiring on first floor. Upper 15 floors are served by Headerduct in cellular-floor construction. Simplicity of Spang Raceway Systems provided a time-saving, trouble-free installation. Future wiring changes can be made quickly, easily without costly reconstruction, making City Hall modern for years to come. For full information, write to Spang.

Architect: Reynolds, Smith & Hills, Jacksonville
General Contractor: The Auchter Company, Jacksonville
Mechanical Contractor: Henley and Beckwith, Jacksonville
Electrical Contractor: Wesley Paxson Co., Jacksonville
Spang Distributor: Ace Electric Supply, Jacksonville

SPANG UNDERFLOOR DUCT

THE NATIONAL SUPPLY COMPANY
Two Gateway Center, Pittsburgh 22, Pennsylvania
Subsidiary of Armco Steel Corporation


NEW ANACONDA
SEMI-CON TAPE
ORDINARY
SEMI-CON TAPE

NOW YOU CAN GIVE YOUR CUSTOMER A BETTER SPLICE WITH HALF THE EFFORT WITH ANACONDA DURASHEATH HIGH-VOLTAGE CABLE

It has a new, clean-stripping, semi-conducting tape

PROBLEM: To make a sound, safe, high-voltage splice, every last speck of semi-conducting tape material must be removed from the insulation . . . if traces remain, chances are the joint will eventually fail. But—this important step requires tedious scraping and buffing.

SOLUTION: The new Anaconda-developed *clean*-stripping, semi-con tape*, which is an exclusive feature of Durasheath Cable. The photos (left) were taken immediately after semi-con tapes were stripped off the insulation. It takes much longer to get other cable insulation surfaces as clean. That's why this exclusive feature makes splicing a great deal easier.

The planned research and production program which brings you this outstanding cable development is also responsible for the equally important developments in Butyl rubber insulation compounding and extruding—which have produced the best possible balanced design and construction in high-voltage rubber-insulated cable obtainable today—Anaconda Durasheath.

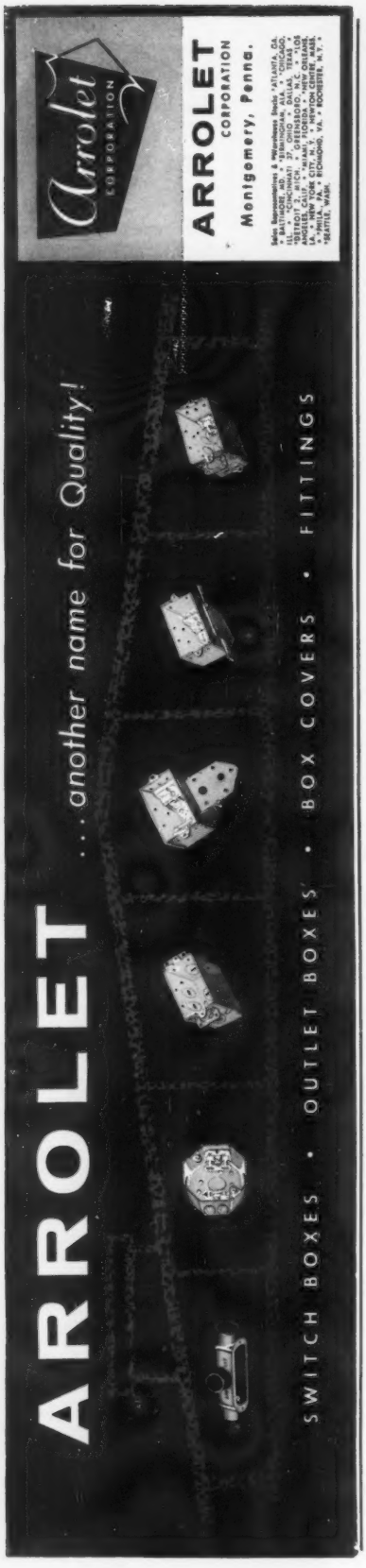
For additional, more technical information about Anaconda Durasheath, write for Anaconda Bulletins DM-5903, covering Durasheath High-Voltage Cable, and DMS-5566, -5720 and -5735, dealing with the Splicing & Terminating of Durasheath Cable. Contact your nearest Anaconda Wire & Cable Company District Office, or write to 25 Broadway, New York 4, N. Y.

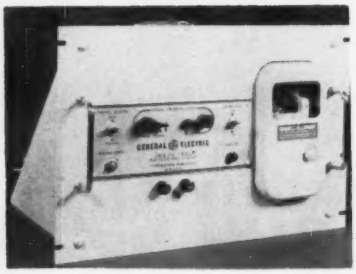
*Pat. applied for 6020C Rev.

ASK THE MAN FROM

ANACONDA®

FOR DURASHEATH® CABLE





Voltage Regulators (25)

A new 3-phase rack-mounted Inductrol voltage regulator for use by switchboard and panelboard manufacturers. Three-phase loads up to 15 kva can be handled by this 19-in. rack design. Available either automatic or motor-driven, this regulator features no brushes, introduces no waveform distortion, and is unaffected by power factor, frequency or load. Controls are drift-free and maintain plus or minus 1% bandwidth accuracy over a temperature range of −60 C to +60 C.

General Electric Co., Pittsfield, Mass.

Fixture Hanger (26)

New "EFHC" explosion-proof fixture hanger is for use when suspending fluorescent or incandescent explosion-proof or dust-tight pendant lighting fixtures. Threaded hub leading from bottom of fixture stem is tapped and has a set screw to insure against conduit loosening. Series is available with ¾-in. and 1-in. feed-thru hubs in combination with ½-in., ¾-in. and 1-in. fixture stem hubs. A connection block, Catalog No. 11385, is available and fits all "EFHC" series hangers. A mounting strap can be furnished to fasten hangers directly upon a flat mounting surface. Fixture hanger Unilet has been approved by UL for Class I, Groups C and D, and Class II, Groups E, F, and G. Bulletin No. 759 is available.

Appleton Electric Co., 1701 West Wellington Ave., Chicago 13, Ill.

Disconnect Switch (27)

Type PEB hook stick switches are available for outdoor substation applications in the horizontal mounting position between station bus support and breaker bushing. With a momentary rating of 20000 and 40000 amps, switches have a continuous current rating of 600 and 1200 amps at voltages of 115, 138 and 161 kv. Features of switch line are adjustable front-contact mounting allowing for variations in structure elevations; positive-latch and pry-out assembly; counterbalance pring; and permanent lubrication.

Line Material Industries, McGraw-Edison Co., Milwaukee 1, Wis.

Motors (28)

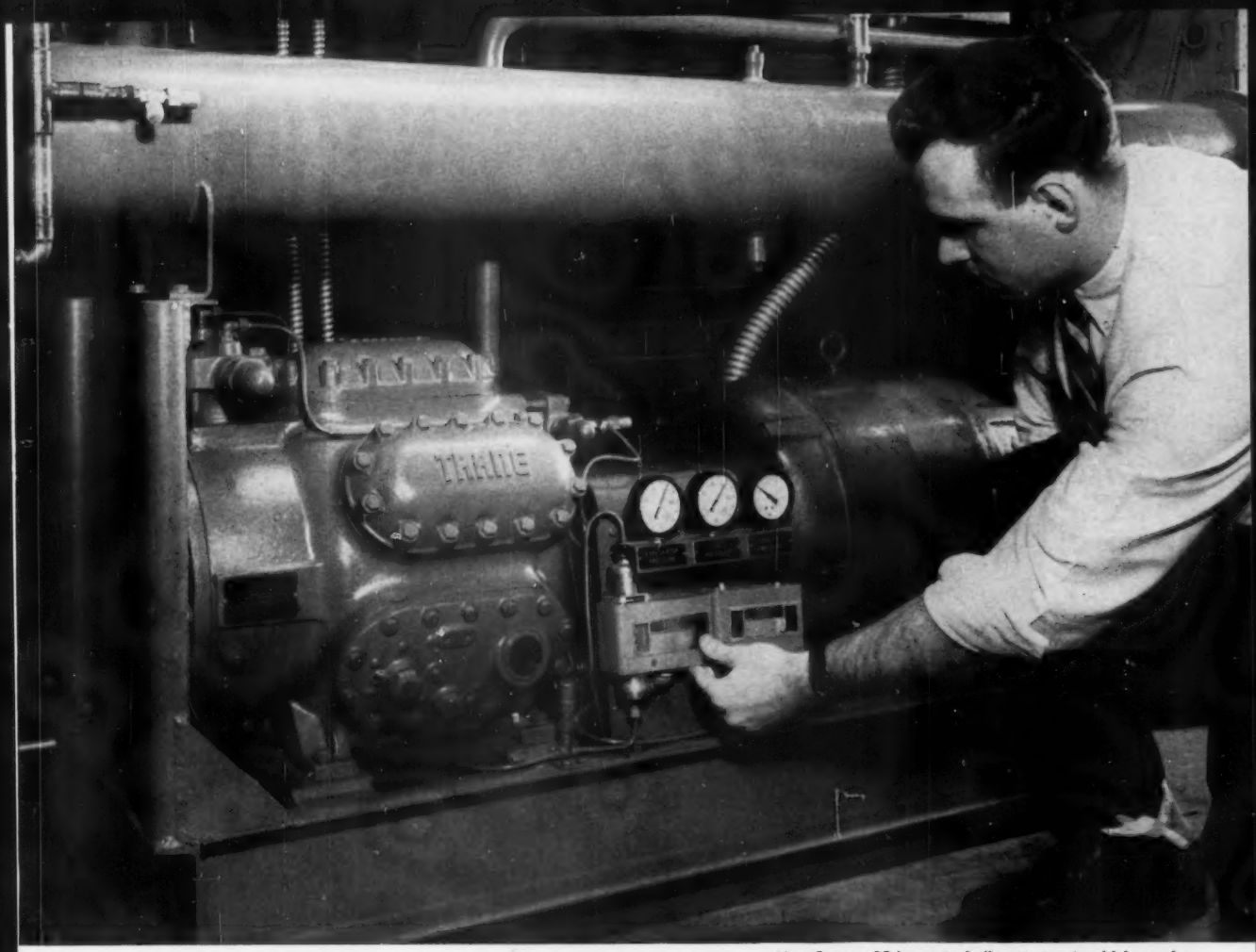
A new line of large squirrel-cage motors, 250 through 1000 hp, built for heavy-duty industrial applications. Flat steel endplates are built in two sections. Enclosure is completely drip-proof with ventilating openings so located and shielded as to provide splash-proof protection. Both stator and rotor core are constructed to permit radial as well as transverse circulation of air dissipation of heat. Available voltages are 440, 550, 2300 and 4160, 60 cycles. Entire range of ratings, 250 through 1000 hp can be supplied with full load speed of 3500, 1750 or 1160 rpm; 870 and 690 rpm motors are available through 700 hp and 575 rpm motors through 500 hp.

Wagner Electric Corp., 6400 Plymouth Ave., St. Louis 14, Mo.

Lighting Fixtures (29)

Three new fluorescent lighting fixtures, known as Bristol, Northwood and Colony. Shieldings offered include "Poly-Blok" louvers and color-stable polystyrene in smooth opal or clear prismatic wraparound. The new series will be supplied in 2-lamp, 40-watt, rapid start; 4-lamp, 8-ft tandem RS or 2-lamp, 8-ft slimline models and are available with or without top plates.

Keystone Electric Manufacturing Co., 2228 East Tioga St., Philadelphia, Pa.



New Century 30 hp part-winding start motor driving reciprocating compressor. Compressor is part of an air conditioning system in an industrial test and research laboratory.

New Century Electric motor for part-winding start

Problem: power company restrictions limit inrush current . . . a part-winding start motor is called for, but . . . acceleration must be smooth and quiet with no risk of stalling at two-thirds of full speed.

Answer: the new Century part-winding start motor.

A special winding scheme makes this performance possible. So now you can have part-winding start, dependable power and smooth acceleration all in the same motor. Century part-winding motors provide the most economical and dependable way of starting equipment such as fans, blowers, centrifugal pumps and compressors, as well as reciprocating compressors with unloading valves (like the one shown here). They are available in 20 to 150 hp sizes and in speeds of 1200 and 1800 rpm.

Why do Century Electric part-winding motors provide reliable power? Here are a few of the reasons: windings are dipped and baked with several coats of a high temperature synthetic varnish which protect against oil fumes, mild acids, dust and grit . . . rotors are dynamically balanced so motors run smoothly and quietly . . . rugged cast iron frame gives long life and reduces noise level . . . coils are insulated with a tough polyvinyl resin.

For more information on Century's complete line of motors (1/20 to 400 hp) please contact your local Century Electric Sales Office or Authorized Distributor.

CENTURY ELECTRIC COMPANY

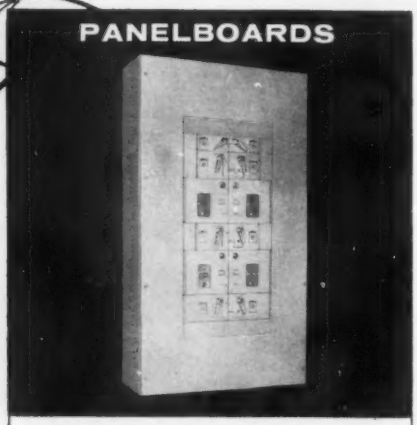
St. Louis 3, Missouri *Offices and Stock Points in Principal Cities*

Century

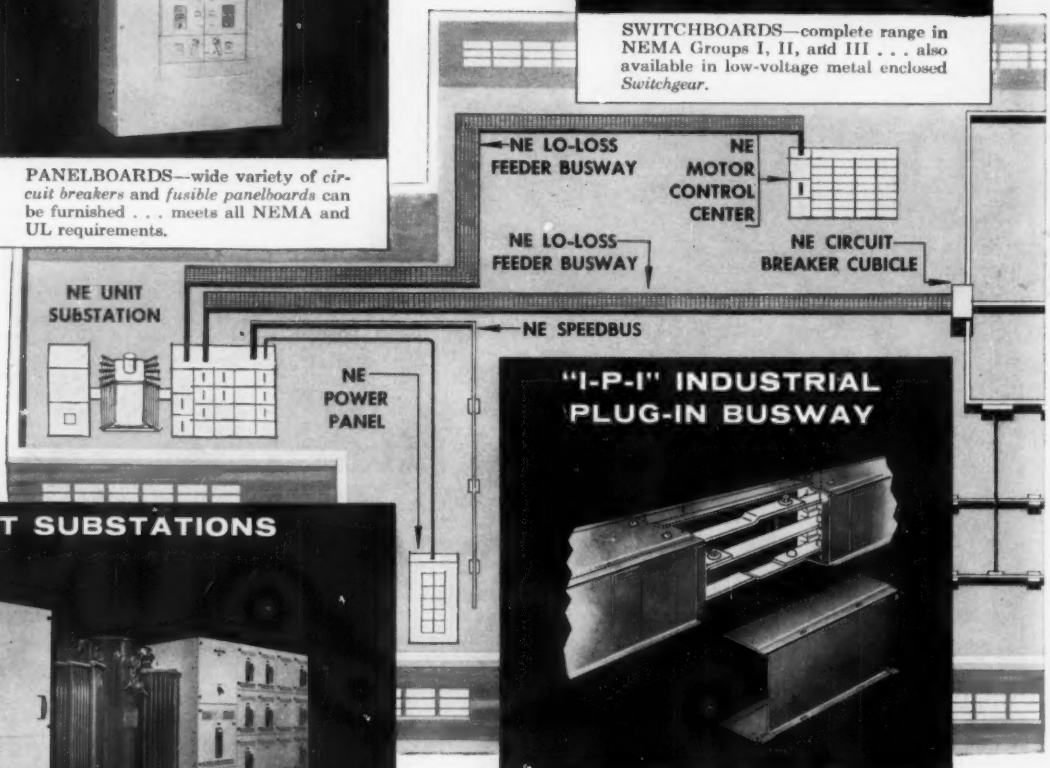
60-6

NEW...NATIONAL ELECTRICAL

SWITCHBOARDS—complete range in NEMA Groups I, II, and III . . . also available in low-voltage metal enclosed *Switchgear*.



PANELBOARDS—wide variety of *circuit breakers* and *fusible panelboards* can be furnished . . . meets all NEMA and UL requirements.



"I-P-I" INDUSTRIAL PLUG-IN BUSWAY—up to 1500 amps at voltages up to 600 . . . versatile and time-tested . . . complete range of take-off and protective devices.

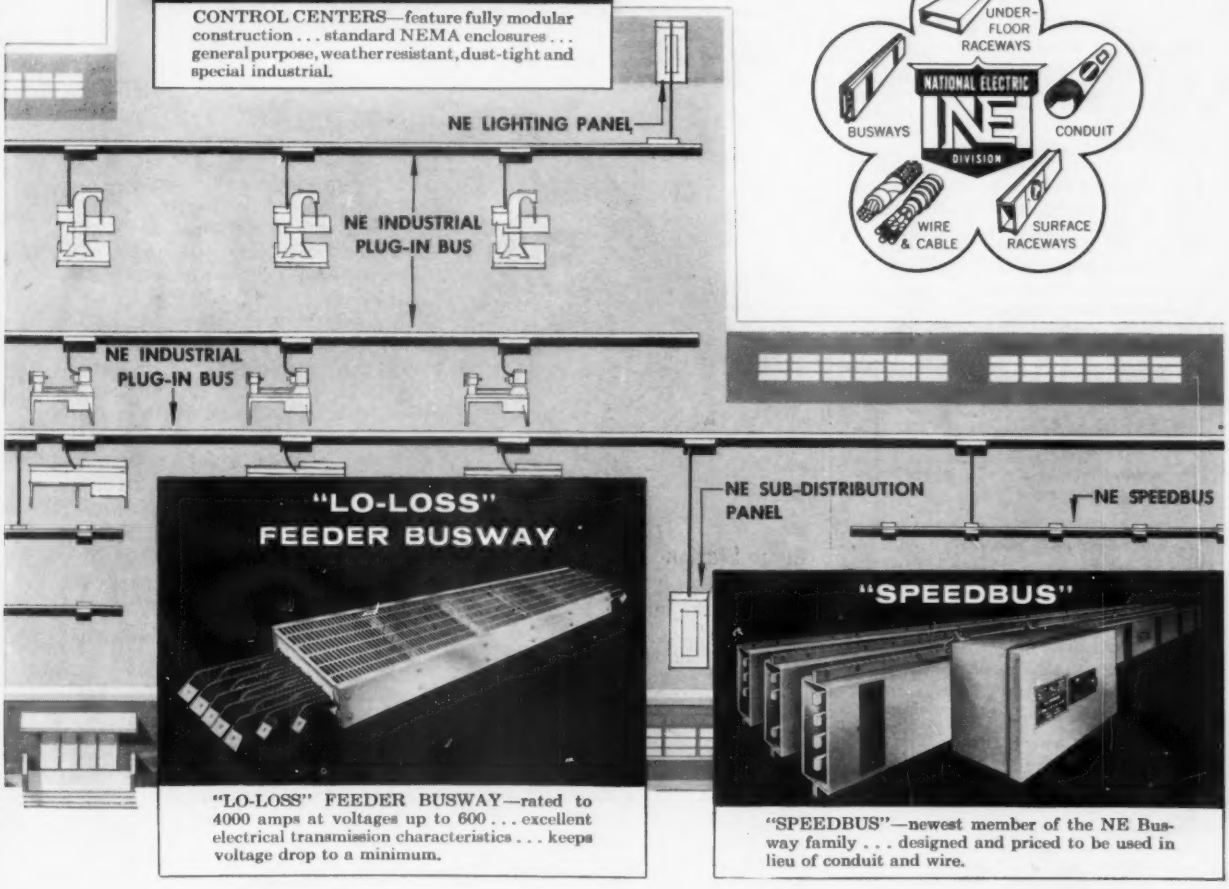
UNIT SUBSTATIONS—available as packaged units in Group I (600 Volts) and Group II (5 and 15 KV) . . . special and custom arrangements can be supplied.

ELECTRIC OFFERS COMPLETE DISTRIBUTION SYSTEMS

Time-tested National Electric busways are now combined with a new line of high quality switchboards and panelboards to provide complete systems to meet every plant's power and lighting distribution requirements.

For further information about all the advantages of our one-source service ask N-E Man, or write for complete catalog on National Electric Distribution Systems. Address: *National Electric Division, H. K. Porter Company, Inc., Porter Building, Pittsburgh 19, Pennsylvania.*

CONTROL CENTERS—feature fully modular construction . . . standard NEMA enclosures . . . general purpose, weather resistant, dust-tight and special industrial.



"LO-LOSS" FEEDER BUSWAY—rated to 4000 amps at voltages up to 600 . . . excellent electrical transmission characteristics . . . keeps voltage drop to a minimum.

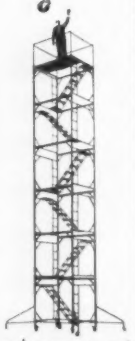
"SPEEDBUS"—newest member of the NE Busway family . . . designed and priced to be used in lieu of conduit and wire.

NATIONAL ELECTRIC DIVISION PORTER **H. K. PORTER COMPANY, INC.**

PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.

HIGHER and WIDER

New BAKER Model K Scaffold uses standard BAKER Scaffold components



1. Big 28 sq. ft. working platform area.

2. Platforms adjust in 3-inch increments—same as the standard Baker Scaffold.

3. Uses same side trusses, same metal-bound plywood platforms—(uses two), same casters, the same positive spring-loaded safety locks and many optional accessories of the standard Baker Scaffold.

4. Stairway, base extensions and casters optional.

THE BAKER SCAFFOLD
Standby for maintenance and general utility work

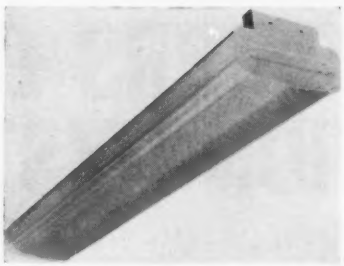
The Baker Scaffold is universally used in contracting and general maintenance work. Easy to transport, it assembles in 90 seconds; moves on large, easy-rolling casters.

The platform adjusts every three inches to any desired height and locks with positive spring-loaded safety latches. Will pass through doors, around sharp corners, over obstacles.

Write today for more complete information on these two utility scaffolds.

Listed Under Re-examination Service Underwriters' Laboratories, Inc.

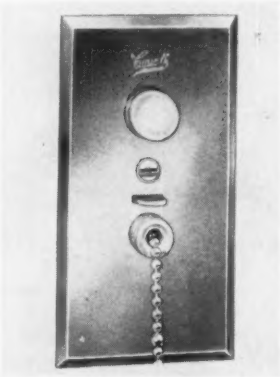
BAKER SCAFFOLDS
DESIGNED FOR PORTABILITY • BUILT FOR DURABILITY
BAKER-ROOS, INC.
P. O. Box 892, Dept. #603, Indianapolis 6, Ind.
DISTRIBUTORS IN PRINCIPAL CITIES



Fluorescent Fixture (30)

A fluorescent fixture which features a swing-down diffuser and a hinged reflector, called PR 240-A Prisline. The prismatic plastic wrap-around diffuser unit incorporates a clear basket-design and can swing down from either side. It has longitudinal ribs on side and small pyramid design on bottom. The V-type reflector, which houses the ballast and sockets, hinges down from either side of channel. It mounts two 40-watt rapid start lamps.

Light & Power Utilities Corp., Olive Branch, Miss.



Room Station (31)

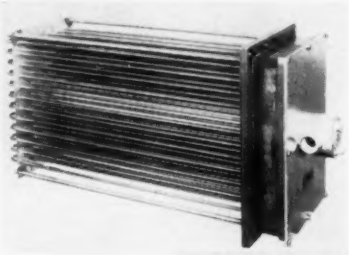
A Universal room station provides visual signal for nurse assistance. A patient calls a nurse on this room station by pulling the cord which momentarily sounds a buzzer at the supervisory annunciator and then releases the cord which lights a signal lamp at the same location. Buzzers are also sounded at duty stations, and bedside lights may also be turned on automatically when cord is released. Station is reset by pressing lever at center of plate. All Series H700 stations feature: single gang, stainless steel plate; printed circuit; plastic housing; safety breakaway link; and a 6-ft nylon cord which can be sterilized.

S. H. Couch Company, Inc., 3 Arlington St., North Quincy, Mass.

Transformer (32)

A new pad-mounted transformer is designed especially for commercial suburban areas with heavy low-voltage load concentration. High-voltage and low-voltage dry-type enclosures accommodate either cable or bus work. Entire enclosure lifts away from the transformer for complete freedom in making connections. They are available in 3-phase sizes, 225 through 1500 kva with high voltages 2400 through 13,800, and with low voltages of 208Y/120 or 480Y/277.

Allis-Chalmers Manufacturing Co., Milwaukee 1, Wis.



Heaters (33)

New high-temperature duct heaters are designed for heating air or gases under conditions of high pressures, high velocities and high temperatures. They are recommended for direct heating or air process heating in large-scale drying operations encountered in nuclear power plants, wind tunnels, industrial ovens, etc., and for heat treating and annealing. Heaters are constructed of alloy sheath tubular elements mounted in a steel flange, complete with mounting holes for attaching to duct assemblies. NEMA class terminal boxes are supplied to meet specific applications.

Vulcan Electric Co., 88 Holten St., Danvers, Mass.

Connecting Device (34)

A new aluminum conductor connecting device, called "Jiffy Joint," is available for joining ACSR (aluminum conductor, steel reinforced) and aluminum alloy conductors. Single sleeve joint will develop the full mechanical and electrical properties of the composite joint it is designed to replace. Jiffy Joint is available in sizes to join conductors from No. 4 through 500 MCM.

Aluminum Company of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa.

Some basic steps to SILENT VENTILATION

The Most Important Step you can take when it comes to deciding *which* power roof ventilator is right for you is to look at an Ilg LSQ. If *capacity* is a prime factor, step up and see Ilg's 11 sizes: from 87 c.f.m. all the way up to 21,000.

If it's *silent operation,* then check these features: direct-connected fan and motor eliminate belts and pulleys; patented Type "Q" wheel is dynamically balanced before being connected to permanent-split capacitor 1-phase or 3-phase motors; totally enclosed constant- and 2-speed motors assure smooth power flow.

For a *first* step toward better ventilation, write for Bulletin No. 2302.

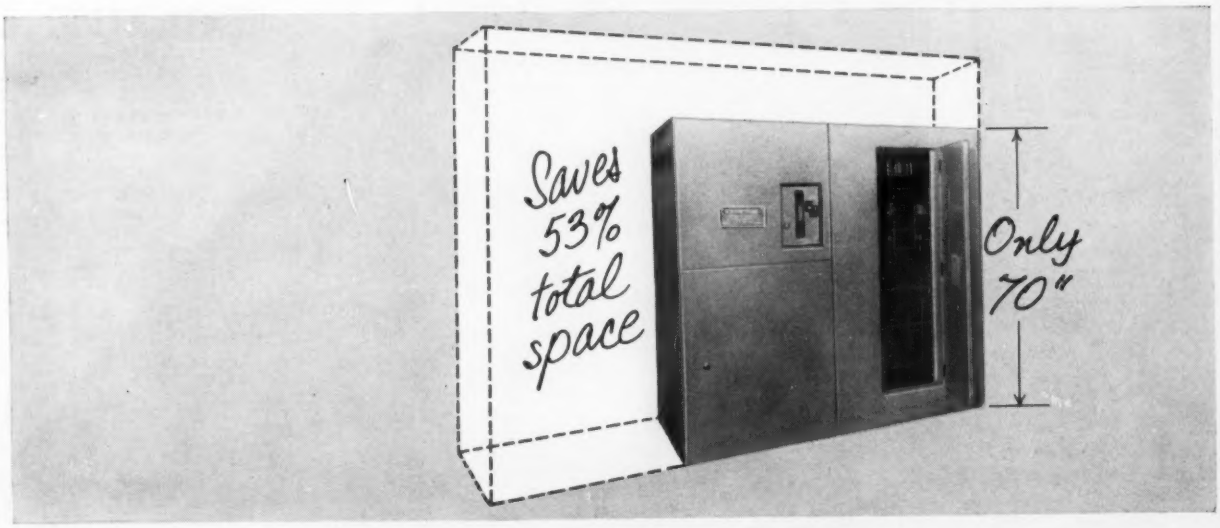
ILG

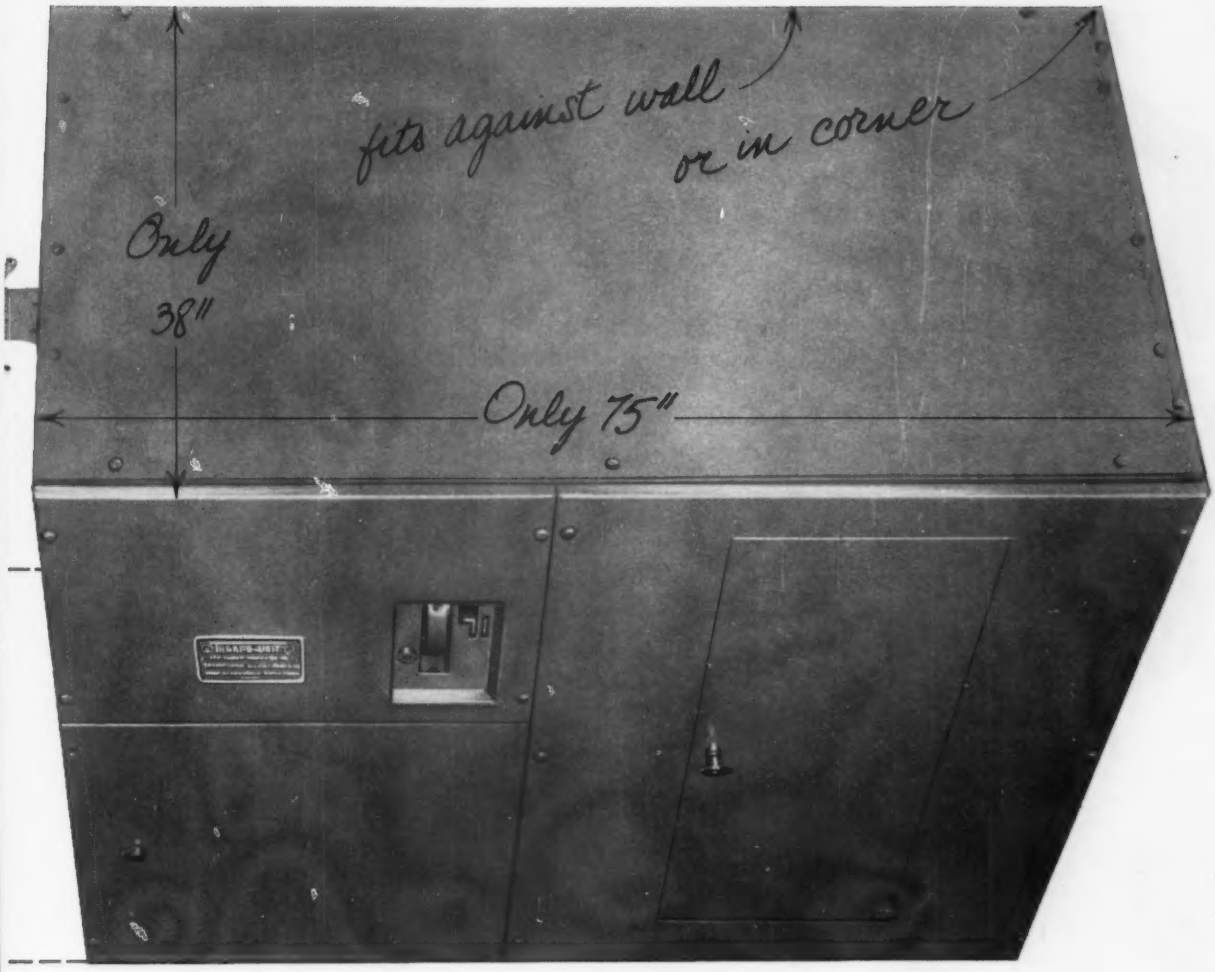
ILG ELECTRIC VENTILATING CO.

2879 N. Pulaski Road,
Chicago 41, Ill.
Offices in
60 Principal Cities

Member of Air Moving
and Conditioning
Association, Inc. (AMCA)

NEW SPACE-SAVINGEST





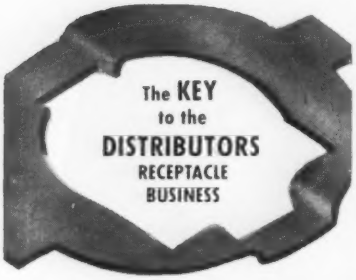
I-T-E TRANFO-UNIT®

Available in capacities up to 500 kva at 5 kv

This packaged unit substation fits in places where others cannot go. In fact, it's actually the world's most compact. 20 in. lower than the old standard, 50 in. shorter. Connects from the front. So you can put it against a wall or in a corner. Dry-type transformer and a wide choice of primary and secondary devices. Send for the complete kit of information. I-T-E Circuit Breaker Company, Dept. TR, 1900 Hamilton St., Philadelphia 30, Pa.

I-T-E CIRCUIT BREAKER COMPANY

Latrobe



"UNLOCK" the source. Receptacle source now the DISTRIBUTOR'S SHELVES with these popular standards' ability to be "LAID-IN"

FULLMAN'S Adjustable STEEL BOX

190 Series of N R (No Receptacle) Boxes

TO INSTALL—You simply drop the round KEY into slots in adjusting ring—"LAY-IN" receptacle you select and "LAY-ON" receptacle ring—that's all—very simple operation

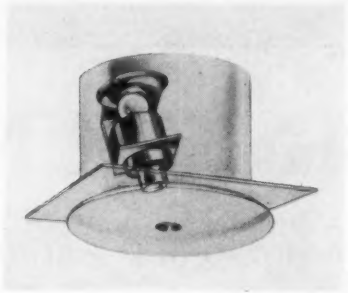
Sales Representatives in all principal Cities

Fullman
MANUFACTURING COMPANY
1209-1215 JEFFERSON ST.
LATROBE, PENNSYLVANIA

Ventilators (35)

New line of self-contained, **belt**-driven centrifugal fans featuring an entirely new principle of motor mounting. Motors and fan bearings are mounted on rubber isolation rails, providing a wide range of adjustability and allowing mounting of several different motor frames on one standard base. The Util-A-Set ventilators are designed for applications requiring low and medium ranges of volume and pressure. Backward blade or forward curve wheels are available to meet application requirements. Twelve sizes provide capacity range from 688 to 23,000 cfm. Catalog No. 3401 is available.

Ilg Electric Ventilating Co., 2850 *N. Pulaski Road, Chicago* 41, *Ill.*



Spotlight (36)

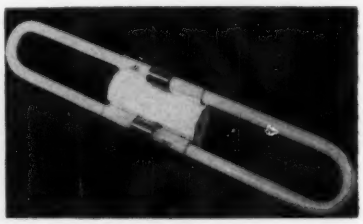
A projector spotlight which casts a beam to an exact room location has been announced. The new "Projecto-Spot" picture spotlight and adjustable downlight is capable of casting rectangles, squares and other geometric shapes to specifically illuminate pictures, corners, tables, or other desired objects or areas. Model H4170 has 4-way frame-in shutters and a projection lens system. Unit operates on one 100-watt lamp. Overall frame dimension is 11¼ in. Housing dimensions are 10 in. dia and 10 in. deep.

Halo Lighting Products, Inc., 401 *W. Grand Ave., Chicago* 51, *Ill.*

Control (37)

A new controlled-speed system for centrifugal pump and fan drives, which provides variable speeds from all-electric induction motors. In most applications, the control system, designated Reactodyne, will be used where it is desirable to automatically control the pump and/or fan speeds. Control of speeds is accomplished by means of a signal from a small potentiometer which can be actuated by liquid level, temperatures, pressure, etc. Drive system is designed for use on "cubic" loads where torque requirements fall off rapidly at lower speeds. Unit is designed to operate from a standard 220/440-volt, 60-cycle ac power supply. Drive motors are available in a wide choice of horizontal or vertical types in open design. Ratings are available from 1 to 30 hp with a 2:1 speed variation.

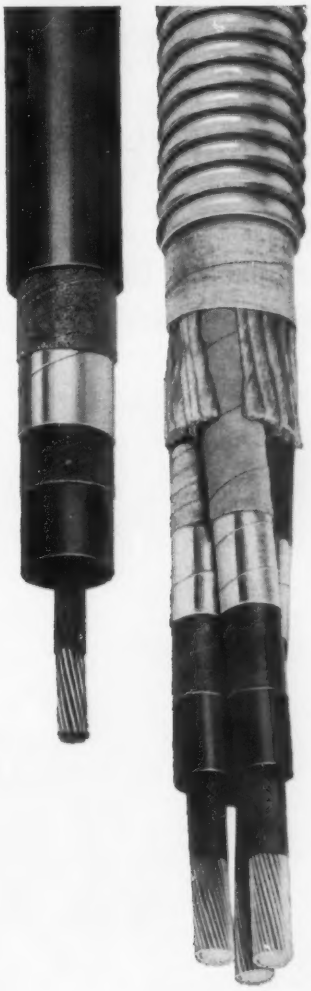
U. S. Electrical Motors Inc., Box 2058 *Terminal Annex, Los Angeles* 54, *Calif.*



Lighting Fixture (38)

A new type of lighting fixture designed to hold U-lamps. They are straight lamps which are bent by a special process into U's so that a standard 96T12 or 8-ft lamp becomes a 4-ft U-lamp giving off the same amount of light, namely 5600 lumens as a standard straight lamp while a standard 72T12 or 6-ft lamp becomes a 3-ft U-lamp giving off the same 4100 lumens as a standard straight 6-ft fluorescent lamp. By snapping two of these U-lamps into the Transolite fixture an ellipse is created either 6 ft or 8 ft in length. Fixture 8½ by 12 in. by 4½ in. can hold either two 6-ft or two 8-ft lamps. Fixtures utilize a socket with snap-in contacts on base pin. Socket floats and there is no strain on contacts. Fixture is made to cantilever tubes so lamps are suspended from fixtures without sag. Base pins are hidden by fixture. Fixture can attach to all types of raceway channels by plugging them in and locking fixture to channel.

Transolite Corp., 515 *Madison Ave., New York* 22, *N. Y.*



how good should power cable be

...*for long term stability?*

It isn't enough to meet or barely surpass specifications—not when it is possible to build maximum performance into power cable—as Circle does. Take, for example, the IPCEA-NEMA 60 cycle water absorption test.

Circlesheath® Type RR Power Cable Performance

In the IPCEA-NEMA "Accelerated Water Absorption Tests," Section 6.9, a sample of power cable is immersed in 50°C water for a period of 14 days during and after which time specific inductive capacity and stability factor are measured.

Not only does Circle butyl-insulated power cable far surpass all minimum specifications after 14 days immersion—*but continues to do so after one year and eight months of continuous immersion. And the test is still going on!*

Date of original immersion: September 1958 Date of last test: April 1960

CABLE DESCRIPTION: 15KV, UNGROUNDED, SHIELDED	CIRCLESHEATH® CHANGE SIC	PERFORMANCE STABILITY FACTOR
700,000CM	4.3%	.6%
300,000CM	3.9%	.5%
300,000CM	3.6%	.4%

IPCEA-NEMA Requirements: Change SIC 1 to 14 days: 5% max.—stability factor after 14 days: 1% max.

The manufacture of high-reliability power cable is no accident. It requires expert knowledge of compounding techniques, absolute quality control—and production men who not only care enough . . . but *know enough* to produce the very best.

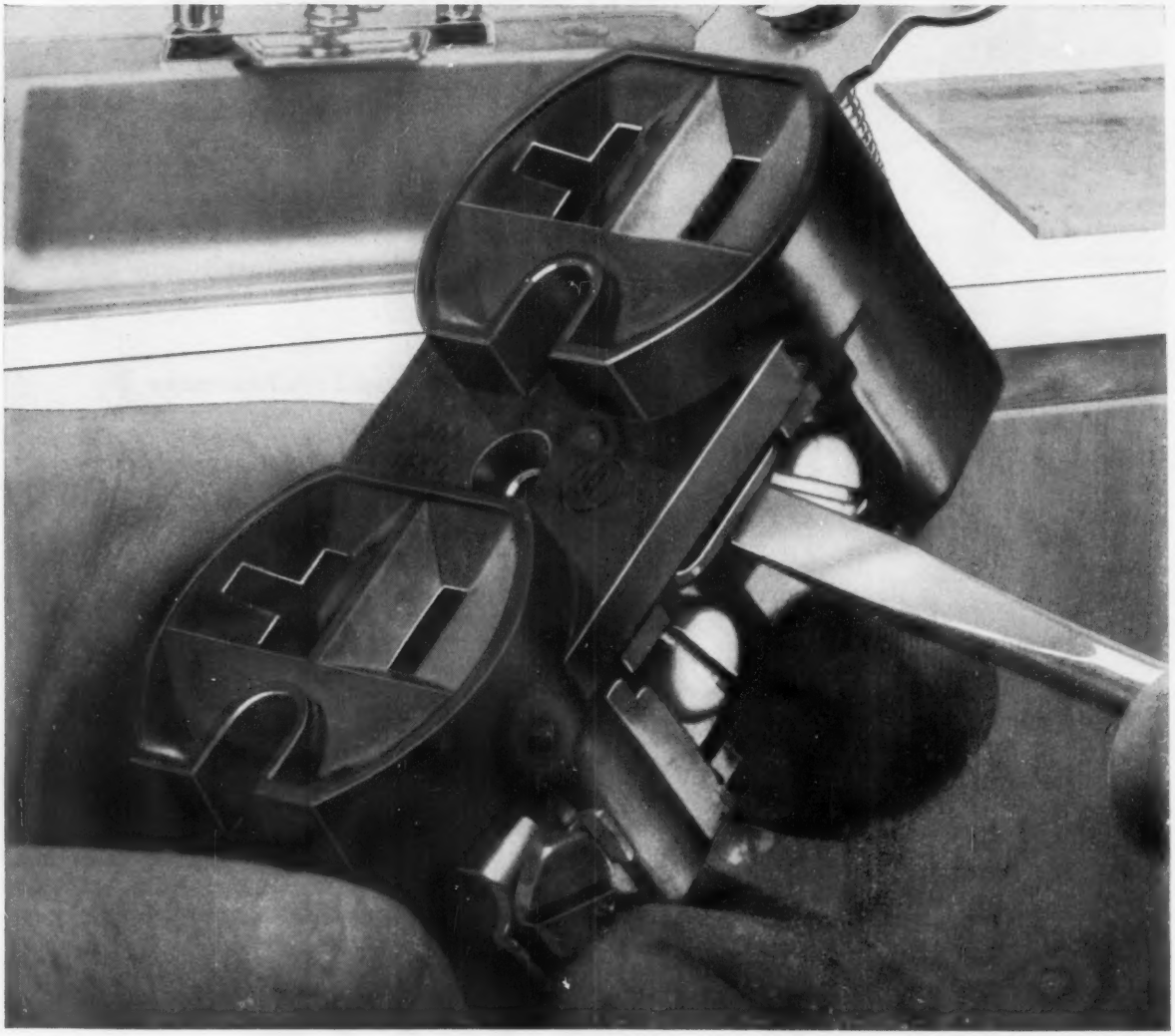
Circle CIRCLOC® Interlocked Armored Cable combines flexibility with mechanical protection in one lightweight, economical construction. It trains easily over obstructions; is ideal for future plant expansion. Available in galvanized steel, bronze or aluminum armor—from 600 to 15,000 volts.

CIRCLE WIRE & CABLE
a subsidiary of
CERRO DE PASCO CORPORATION

RUBBER COVERED WIRE & CABLE • VARNISHED CAMBRIC CABLE •
PLASTIC INSULATED CABLE • NEOPRENE SHEATHED CABLE • CIRTUBE® EMT

New General Electric outlet protects you and your customers

See how this new GE4108 De Luxe Grounding Outlet meets today's new code requirements PLUS tomorrow's needs!



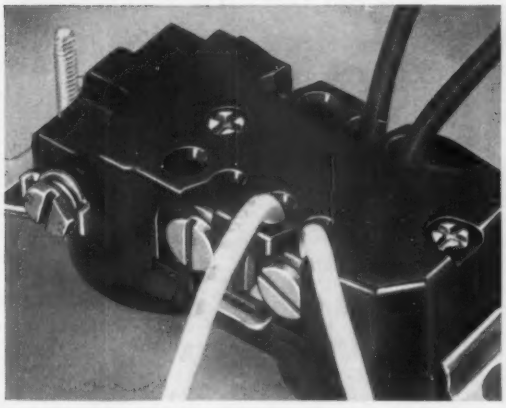
1 MEETS NEW CODES FOR KITCHENS, laundries, dining rooms, offices and other areas where high-wattage 120-volt appliances may be used. You get two 20-A branch circuits from a 3-wire, 120/240V service—or from two separate 20A, 120V circuits. Just remove one or both of the breakoff links on its sides.

2 PLUS—FULL 20A RATING in the outlet itself—not yet required by codes. General Electric provides it so full use can be made of 20A circuits.

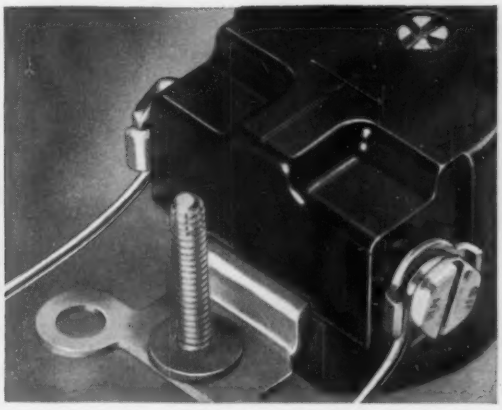
3 PLUS—GROUNDING for appliances, more and more of which will require it. Takes 20A and 15A grounding caps; polarized-parallel and parallel-pronged caps.

with "look-ahead features" from electrical obsolescence

General Electric quality features give you a topnotch installation



EIGHT HOLES FOR BACK-WIRING take all the Nos. 14, 12 or 10 Awg wires you need, "in" and "out" for through wiring—in tight, pressure-clamp connections. You can "loop" wires under screws on the sides.



TWO GREEN GROUNDING SCREWS make it more convenient for you to carry through grounding wires —take straight ends or loops. When all terminals are used, this outlet will take 10 wires!

STURDY CONSTRUCTION, with double-wipe contacts; "through" strap; captive mounting screws. No. GE4108; brown or ivory; 20A, 125V, U.L.—listed, meets Federal and REA specifications.

Plan now to use this years-ahead GE4108 Grounding Outlet wherever high-wattage outlets are indicated. It makes good sense. It gives you a wiring device you can point to with pride, to show your customers you have their best interests at heart.

Ask your General Electric distributor to show you the whole line of high-quality G-E devices — engineered to meet today's codes *plus* tomorrow's needs! General Electric Company, Wiring Device Department, Providence 7, Rhode Island.

Progress Is Our Most Important Product

GENERAL ELECTRIC

ONE TIME...

CLOCKS

SIGNALS

RECORDERS

...THROUGHOUT YOUR PLANT WITH A

Cincinnati TIME SYSTEM

See the yellow pages for your local representative, or write for full information on how Cincinnati time equipment can solve your time problems.

ENGINEERING • SALES • SERVICE

THE Cincinnati TIME RECORDER CO.
1737 Central Ave.
Cincinnati 14, Ohio
SINCE 1896

IF IT'S ABOUT TIME...
CALL FOR CINCINNATI

Power Supply (39)

A new "RD" series of heavy-duty, regulated dc power supplies range in output from 3 to 1000 volts and from 50 to 3000 watts. They are available in six sizes for standard rack mounting. Units are completely self-protecting against damage from overload and short circuits. Good voltage regulation is obtained by use of a ferro-resonant, line-regulating transformer in conjunction with low forward-drop silicon rectifiers. A capacitance input filter reduces ripple to within plus or minus 1%.

Raytheon Company, Keeler Ave., South Norwalk, Conn.

Oil-Fuse Cutout (40)

Full 110 kv BIL and heavy interrupting duty are features of the new Type FC72, 15 kv oil-fuse cutout. Cutout can interrupt 7000 amps symmetrical single-phase or 100,000 kva symmetrical on 3-phase applications. Continuous load-current rating is 200 amps. Overcenter travel locks both "On" and "Off" positions. Interrupter unit with fuses and replaceable switch contacts is raised into dome above oil when cutout is switched to "Off" position. Dome cannot be opened while switch is in "On" position.

G & W Electric Specialty Co., 3500 West 127th St., Blue Island, Ill.

Motor (41)

New permanent magnet type synchronous motor called Slo-Syn, Type SS250, is designed primarily for heavy duty industrial use. It can be started, stopped or reversed instantly with a single-pole, 3-position switch. When used as an incremental positioning device, dc voltage applied to the field windings converts one revolution of motor shaft into 200 precise steps. Ratings are: input 120 volts, 40/70 cycles, 1-phase, 0.6 amp maximum current at 60 cycles; 72 rpm output speed at 60 cycles; 250 oz-in. torque.

Superior Electric Co., Bristol, Conn.

Switch (42)

A new series of 20-amp double pole toggle switches designed in basic dimensions with standard operating characteristics. Electrical ratings are: 20-amp, 125-volt, ac, 1½ hp; 20-amp, 250-volt, ac non-inductive; 10-amp, 250-volt, ac, 2 hp. A choice of mounting arrangements, terminals, and circuitry make the switch adaptable to a variety of industrial and consumer products. Terminals come in either spade, screw, or solder type.

McGill Manufacturing Co., Inc., Valparaiso, Ind.

Press Button (43)

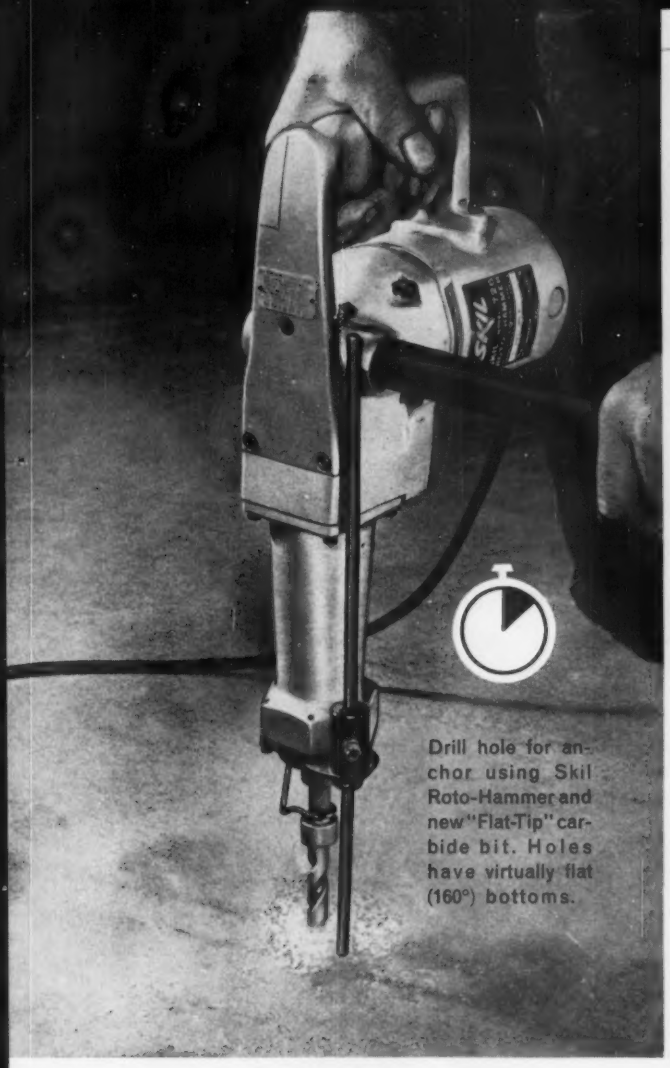
A new palm-operated press button for stamping presses is available for mounting in a machine cavity or in its own oil-tight enclosure. It has heavy-wall die-cast construction. Cover screws are self-retaining and terminals are readily accessible. Conduit openings are positioned for convenient installation. Plates are color-coded for identification. Standard button is equipped with a non-telegraphing single-pole double-throw snap switch, but is also available with two switches for double-pole double-throw action when required. Bulletin SM-294 is available.

Square D Company, 4041 North Richards St., Milwaukee 12, Wis.

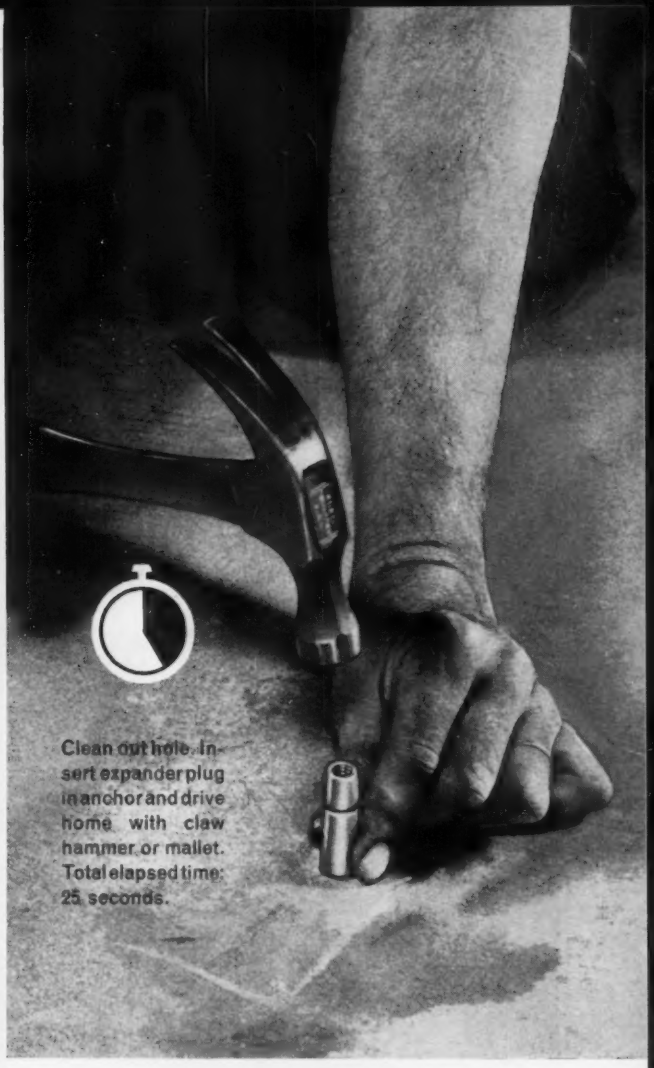
Cabinet (44)

New Model 14 console cabinet for mounting electrical and electronic machine controls is designed for industrial use. Unit is oil- and dust-tight and is made of 14 gauge steel. Sloping top has a hinged, removable panel on which user can mount control buttons, switches and meters. Panel is at operator level, 32 in. from floor. One or two 24-in. by 18-in. sub-panels can be installed inside console body. Either stationary or swingout panels are available for this purpose. Vertical racks are also available for mounting electronic chassis inside body instead of sub-panels. Console is 50 in. high, 24 in. wide and 23 in. deep.

Hoffman Engineering Corp., Anoka, Minn.



Drill hole for anchor using Skil Roto-Hammer and new "Flat-Tip" carbide bit. Holes have virtually flat (160°) bottoms.



Clean out hole. Insert expander plug in anchor and drive home with claw hammer or mallet. Total elapsed time: 25 seconds.

New Skil method sets anchors* 400% faster at 1/3 the cost . . .

using Model 726 Roto-Hammer and new Skil "Flat-Tip" Carbide Bits

COMPARISON TEST Based on setting 1000 self-drilling anchors for ⅜" bolts in 9/16" diam. holes (labor at $3.00 per hr.)					
	NEW SKIL METHOD	1 No. 23536 Flat-Tip Bit used	6.80 hours labor required	$37.40 total cost (labor and bit)	3.7¢ cost per anchor setting
	CONVENTIONAL METHOD	1 chuck wrench needed	28.33 hours of labor required	$94.52 total cost (labor and chuck wrench)	9.4¢ cost per anchor setting

NOTE: Cost of anchors (same for both tests) not included.

Ask your Skil distributor for a demonstration. Look under "Tools—Electric" in the Yellow Pages. Or write Skil Corporation, Dept. 130I, 5033 Elston Avenue, Chicago 30, Illinois. In Canada: Skiltools Limited, Trenton, Ontario.

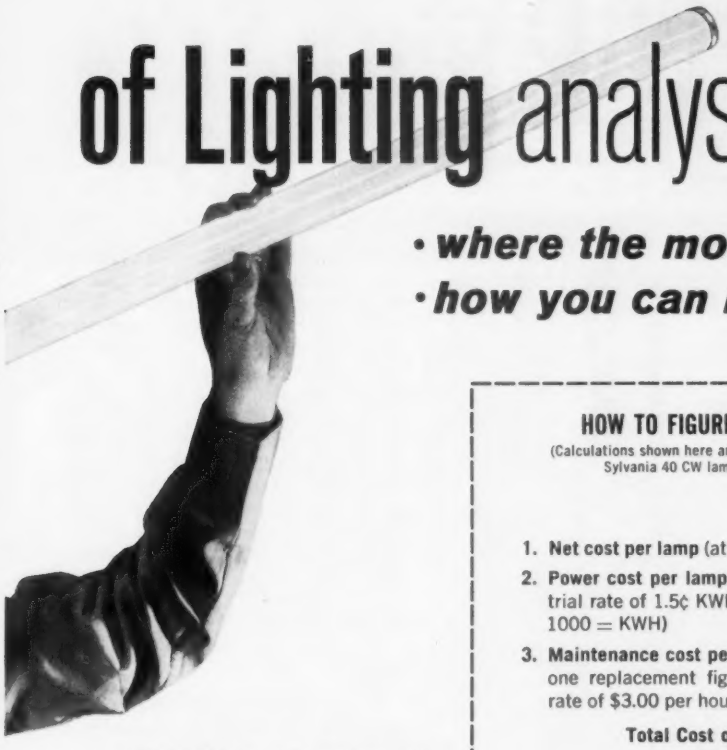
*Self-drilling and expansion type shields, also new types about to be announced.

Automatic Power Rotation. Model 726 drills holes without tiresome hand turning of star drills. Low maintenance. No springs to break.

SKIL ... AND SKILSAW POWER TOOLS

If you just figure
the cost of lamps
you only know about
1/10th of the story!
Only a Total Cost
What about
cost of
power?
What about
his time?
What about
cost of lamps?

# of Lighting analysis can show



- ***where the money really goes***
- ***how you can really cut expenses***

HOW TO FIGURE YOUR TOTAL COST OF LIGHTING (TCL)

(Calculations shown here are based on the average 7500-hour operating life of a standard Sylvania 40 CW lamp which requires 46 watts of power including ballast.)

	National average per lamp	Put your costs here
1. **Net cost per lamp** (at average discount of 35%)	$ .81	
2. **Power cost per lamp** based on average industrial rate of 1.5¢ KWH (watts × 7500 hours ÷ 1000 = KWH)	5.18	
3. **Maintenance cost per lamp** (one cleaning plus one replacement figured at average industry rate of $3.00 per hour)	2.00	
Total Cost of Lighting (TCL) per lamp	7.99	
TCL for 100-lamp installation	$799.00	
(Note: If you use 100 Sylvania lamps, figure the 8% extra lighting value of 8 lamps over 100 ordinary lamps.*)	× .08	
Saving through extra Sylvania lighting value*	$ 63.92	

*These are the extra dollars you would have to spend per 100 ordinary lamps to get the equal lumen hours of light you get from Sylvania.

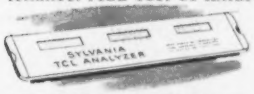
Sylvania is so sure savings will result from figuring this way, we'll even send our representative to show you how (or you can do it here—now!)

With cost of lamps amounting to only about 10% of your *T*otal *C*ost of *L*ighting (TCL), why should Sylvania be so interested in this new over-all way of figuring? Two good reasons:

First, because TCL best demonstrates the over-all superiority of Sylvania fluorescents.

Second, because we believe that just in figuring TCL you'll discover a number of new opportunities for shaving costs. And that's one of the things we like to help you do.

What *is* your TCL? Cost of lamps *plus* power *plus* maintenance. Add cost of fixtures, too, if you're remodeling.



WITH TCL ANALYZER, a Sylvania representative can figure in minutes how the special conditions in your plant affect Total Cost of Lighting.

Our representative can help figure special conditions in your plant. With his Analyzer Kit, he can do it in minutes, give you a complete lighting analysis *free*.

He can also show you how and why, for every penny you spend for lamps, power and maintenance, you get more value with Sylvania.

And he'll show how Sylvania backs its claims to lowest TCL with an *exclusive* Light Insurance Policy. *Guarantees* Sylvania fluorescents will perform better *in your own opinion* than the brand you are now using—or your money back!

Call your Sylvania representative. Or write us: Sylvania Lighting Products, a Division of Sylvania Electric Products Inc., Dept. 15, 60 Boston St., Salem, Mass. In Canada: Sylvania Electric (Canada), Ltd., Box 2190, Station "O," Montreal 9.

EXCLUSIVE SYLVANIA LIGHT INSURANCE POLICY is your guarantee of lowest TCL—or your money back!

SYLVANIA

Subsidiary of **GENERAL TELEPHONE & ELECTRONICS**

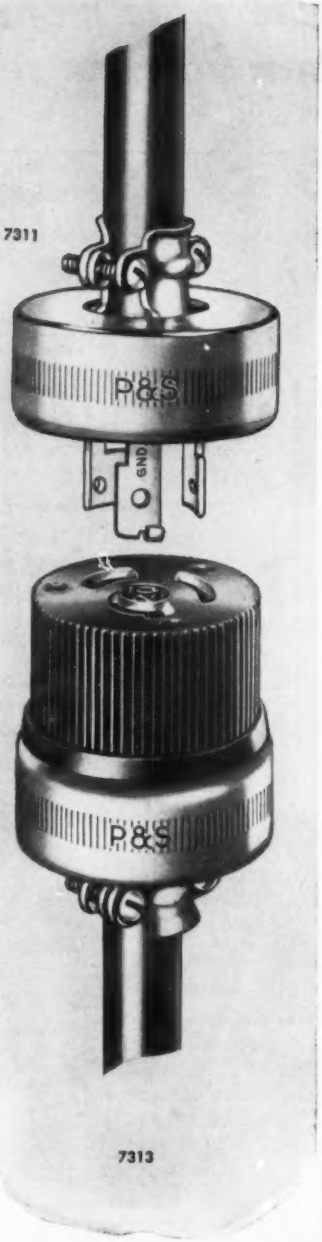
P&S TURNLOK

Built to Take It

P&S TURNLOK wiring devices are designed to give trouble-free service no matter how tough the going gets. TURNLOK devices are available in 10 and 20 Amperes, 2-, 3-, and 4-wire types: receptacles, connectors and caps.

All P&S TURNLOK devices have extra large head binding screws and ample wireways for quick, easy wiring. Armored sections are anchored securely. Cap blades are positioned accurately. Contacts are anchored securely. Fastening screws in connectors are secured in body . . . cannot fall out in wiring. Ratings are plainly visible.

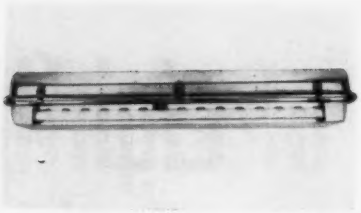
For information about P&S TURNLOK Line, write Dept. ECM-96.



PERFORMANCE SPECIFIED

P&S PASS & SEYMOUR, INC.
SYRACUSE 9, NEW YORK

60 E. 42nd St., New York 17, N.Y. 1440 N. Pulaski Rd., Chicago 51, Ill. In Canada: Renfrew Electric Co., Ltd., Toronto, Ontario



Luminaires **(45)**

Thermoelectrically cooled fluorescent luminaires can be applied in all areas of outdoor lighting. Used with any high output lamp, the thermoelectric device inside the fixture automatically adjusts to different lamp bulb diameters. Luminaire is a 6-ft, 4-lamp, shallow unit employing four Peltier thermoelectric heat pumps for spot-cooling the fluorescent lamps. In heat pump direct current flows through junctions of dissimilar metals, absorbing heat in one junction and liberating heat in the other.

Line Material Industries, McGraw-Edison Co., Milwaukee 1, Wis.

Heater **(46)**

A new heavy-duty fan-forced wall Heetaire, H260 Series, is designed for permanent or occasional heat. Basic Heetaire in all wattages is available in two types; one for recessed mounting in standard 2- by 4-in. on 16-in. center frame walls, and the other for surface mounting on masonry construction. Heaters are equipped with an automatic reset safety switch which disconnects elements and motor if air flow is obstructed in any way. Built-in automatic thermostat control and separate on-off switch are included as standard equipment. Literature is available.

Markel Electric Products, Inc. and LaSalle Products, Inc., Buffalo, N. Y.

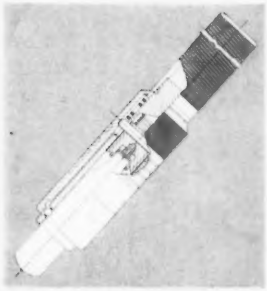
Product Briefs

(47) The series of three downflo units by Wesco central, forced fresh air electric **furnaces,** with optional air conditioning, has been approved by Underwriters Laboratories, Inc. Manufacturer is Northwest Foundry & Furnace Co., Wesco Furnace Div., Portland, Ore.

(48) Pennsylvania Transformer Div., McGraw-Edison Co., Canonsburg, Pa., has announced a new fully **insulated cover** as a standard item for their distribution transformers. . . . (49) New extra heavy NEMA Type 12 **panel enclosures,**

LOW COST LABOR-SAVER for EVERY CONTRACTOR!

Completely NEW



DETAIL DRAWING SHOWING CONSTRUCTION OF GUN

ACTUAL SIZE

Small enough to carry in your pocket!

Cartridge in place for launching

JET LINE GUN!

Fast, safe, easy to use...for all large conduit from 1¼" thru 6"

NOW ONLY $24.50

COMPLETE NO. 1110 KIT

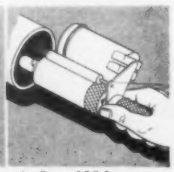
(Jet Line Gun Only, $19.50)

Kit contains: **New Jet Line Gun • Line Can, Nylon Line • Jet Line Cartridges • Nylon Line Packages • Line Can and Package Holder • Cartridge Nose Cone Extensions • Extra Needles**

1. Tie nylon line to cartridge and insert in Gun.

2. Push cartridge all the way back—hard—to puncture and lock in place.

3. Set cartridge into the conduit and release by pushing large barrel forward with thumb. One click does the trick!



4. Over 125 ft., use line package which reduces pull and lays a line as it goes.

RUGGED • POSITIVE ACTION TROUBLE-FREE • COMPACT

This entirely *new*, improved Jet Line Gun costs only *one third as much* as the former model! No contractor can afford to be without it!

The new Jet Line Gun launches a self-propelled cartridge that lays a strong nylon line through large size pipe in *seconds*. Save *hours* on conduit wiring jobs. Distances up to 600 ft. Your Jet Line Gun pays for itself over and over again! The new Jet Line Gun . . . and the Jet Line Cylinder system for small conduit, gives you a new method that can save you up to 70% of your wire pulling costs.

*Pat. #2,930,584

Use the Jet Line Cylinder System for small conduit—½"-¾"-1"

Ask your distributor or write

JET LINE PRODUCTS, INC.

615 FUGATE AVE., CHARLOTTE 5, NORTH CAROLINA

From nuclear power to electric energy...

POWERIGHT PARANITE®

POWER CABLE

The new **Enrico Fermi Atomic Power Plant** near Monroe, Michigan, will be operated by Power Reactor Development Company and The Detroit Edison Company for the expressed purpose of demonstrating the practicability of the use of nuclear energy for the generation of electric power. Criticality is scheduled for December 1960.

Paranite Wire and Cable was selected to supply 600 Volt network and 5000 Volt shielded cables for the nuclear section of this major new development. To us it's evidence once again of the nationwide acceptance of Paranite's 70-year record of dependability.

From 600 volt network through 28,000 volt power cable, Paranite's complete line is ready to serve you. If yours is a special application problem the Paranite engineering department invites your inquiry.

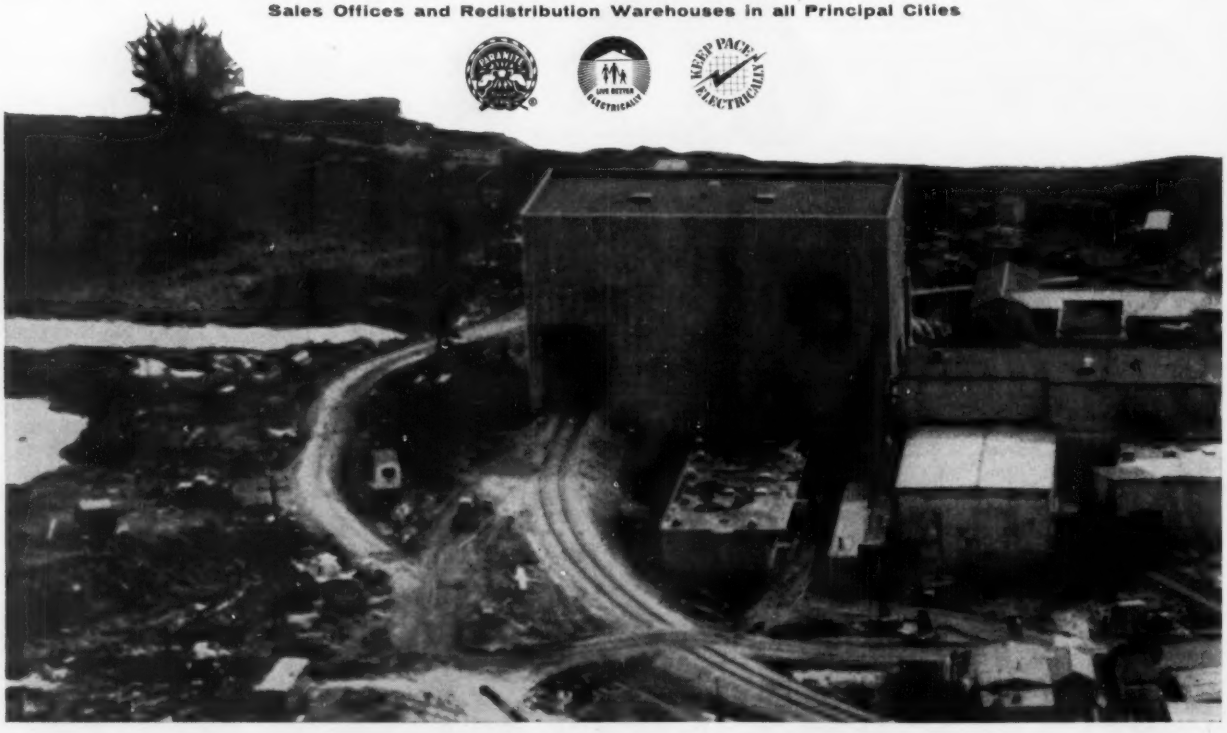
Since 1890

PARANITE WIRE & CABLE DIVISION

ESSEX WIRE CORPORATION, Marion, Indiana

MANUFACTURING PLANTS: Marion, Ind.; Jonesboro, Ind.; Tiffin, Ohio; Anaheim, Calif.

Sales Offices and Redistribution Warehouses in all Principal Cities



A. Paranite HIGH VOLTAGE CABLES are manufactured in a complete range of sizes—1000 through 28,000 volt single conductor, 3000 and 5000 volt three conductor. Adaptable for aerial, direct burial or underground duct installation, wet or dry location.

B. Paranite manufactures a complete line of 600 volt NETWORK CABLES in gauge sizes through 2,000 MCM. Insulations available include 60°C, 75°C and 90°C types for use in either wet or dry locations.

Paranite also makes a complete line of quality building wires.

manufactured to current JIC standards, are available from Keystone Manufacturing Co., Warren, Mich.

(50) Beaver Pipe Tools, Inc., Warren, Ohio, announces a new improved Electrimatic **chuck,** which is available on either their Speed-O-Matic or Model A pipe machines. . . . (51) A new, electric **wall thermostat** that controls both oil and gas heater temperatures between 55 and 85-degrees F has been introduced by the Heating and Air Conditioning Div., Controls Co. of America, Milwaukee, Wis.

(52) Ceilheat, Inc., Knoxville, Tenn., has developed a new **thermostat,** called the "Room Mate" for use with their electric radiant cable heating systems and baseboard units. . . . (53) A new **compound,** called Alum-N-Eas, which stops binding and seizing of aluminum conduit connections, has been introduced by Electro Compound Co., Cleveland, Ohio.

(54) Sequoia Wire & Cable Co., a subsidiary of the Anaconda Wire & Cable Co., New York, N. Y., has announced the availability of new **flexible tubing**—designated as Hyshrink—which shrinks to form tight bond. . . . (55) Talk-A-Phone Chief Redi-Power, a new all-transistorized model, designed to overcome high noise levels and provides complete **intercommunication,** has been introduced by Talk-A-Phone Co., Chicago, Ill.

(56) Associated Research, Inc., Chicago, Ill., has announced their Model 293 Vibroground, a new **instrument** for measuring soil resistance. . . . (57) A new Porcelain pull **receptacle** with a 3-wire "U" ground convenience outlet has been added to the line of porcelain electrical wiring devices by Circle F Manufacturing Co., Trenton, N. J.

(58) Sylvania Electric Products Inc., New York, N. Y., has announced a new white **fluorescent lamp** known as the "Natural White" created primarily for use in stores, restaurants, and public gathering places. . . . (59) Temp-R-Tape TSP, a new pressure-sensitive Teflon **tape** for extreme high-temperature design, has been developed by the Connecticut Hard Rubber Co., New Haven, Conn.

(60) Wood Electric Corp., Lynn, Mass., announces their new miniature combination toggle **switch and circuit breaker** which weighs less than 50 grams.

Catalogs & Bulletins

(61) CIRCUIT BREAKERS. Bulletin 7213, 16 pages, covers Type AF frame-mounted oil circuit breakers with ratings of 23, 34.5, 46, and 69 kv. Federal Pacific Electric Co.

(62) BUS DUCT. Application Data 30-663, 12 pages, gives drawings, specifications, and engineering data of high-frequency bus duct for induction heating systems and other applications. Westinghouse Electric Corp.

(63) BALLASTS for fluorescent lamps are covered in Bulletin GEC-983P, 20 pages, including tables of operating data and prices. General Electric Co.

(64) MAGNETIC CLUTCH. Low-cost Magneclutch is described in 4-page bulletin, including construction and operating features, performance curves, and cutaway drawings. Vickers Inc.

(65) AC MOTORS for low head submerged pumping, single phase and 3-phase, ranging from ¾ to 40 hp, are covered in Bulletin F-1976. U. S. Electrical Motors Inc.

(66) SWITCHGEAR EQUIPMENT. Bulletin GEA-6623B, 8 pages, describes redesigned switch and fuse equipment incorporating rollout feature for easy maintenance. General Electric Co.

(67) VENTILATING TROFFERS. Bulletin B, 44 pages, describes Lumi-Flo troffers, by which cool and warm air may be provided from the same concealed ceiling fixtures for offices, schools, hospitals, hotels, and stores. Thomas Industries Inc.

(68) DIFFUSERS for luminous ceiling lighting applications are covered in Technical Release No. 8, giving complete specifications and instructions for installation and maintenance. Union Carbide Plastics Co.

(69) POWER FASTENINGS for electrical equipment. Application Bulletin A-27 gives complete details for fastening into concrete, masonry, brick and steel with new power-piston tool. Hilti.

(70) MOTOR SELECTION GUIDE, GED-3909A, is a 3- by 7-in. pocket-size card tabulating data for both dripproof and totally enclosed fan-cooled Tri-Clad squirrel cage horizontal motors. General Electric Co.

(71) UNIT HEATER incorporating a fused quartz element for use in such areas as swimming pools, sun porches, patios, and bowling alleys, is described in new literature. Units are rated at 500, 750, 1000, 1450 and 2000 watts. Apextro Products Co.

(72) CONDULETS for corrosive locations. Bulletin 2699, 20 pages, gives information on corrosive substances, with descriptions of Condulet metals and finishes. Crouse-Hinds Co.

(73) LIGHTING LAYOUT for baseball field is given, with pole types, mounting heights, type and number of floodlights, and load requirements for infield and outfield, in 1-page Bulletin OLP-1014. General Electric Co.

(74) TOGGLE SWITCHES. New bulletin describes new 0111 series of 20-amp toggle switches, including circuitry, ratings, and operation. McGill Mfg. Co., Inc.

(75) MOTOR PROTECTION. New Everseal silicone rubber protection against adverse environments for windings of form-wound motors, 150 hp and up, is covered in Bulletin F-2022. U. S. Electrical Motors Inc.

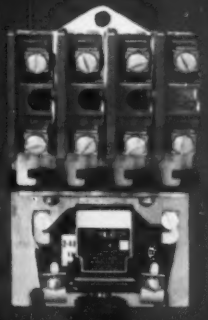
(76) LIGHTING LAYOUT for poster panels and highway guide signs is shown in 1-page Bulletin OLP-1009, including sample problem and solution, recommended illumination levels, and formula for computing number and type of units required. General Electric Co.

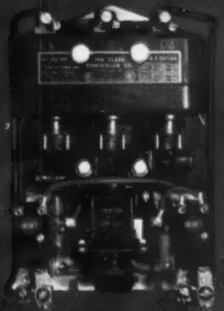
(77) INSULATING OILS for transformers and cables are discussed in new 6-page Bulletin 58, including information on functions, characteristics, properties and uses. Sun Oil Co.

(78) UNDERWATER FLOODLIGHTS, vaportight lighting fixtures, walk and pole lights, and outdoor receptacles are described with complete specifications in 4-color Bulletin 3-A, 38 pages. Russell & Stoll Co. Inc.

(79) STEPPING MOTORS. Data Sheet No. 1, 4 pages, explains use of Slo-Syn synchronous motors as dc stepping motors, with diagrams and characteristics charts. Superior Electric Co.

(80) ELECTROMAGNETIC CONTROLS. Catalog accessory kit 57-SAK-1 contains up-to-date catalog sheets on battery chargers, automatic transfer switch accessories, and controls. Automatic Switch Co.





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CLARK CONTROLS...

NEW Push Button Line

"PM" Relay Line...

with new "Color-Selective" Conversion Kits

Type "CY" Starters... the standard for longer operating life

SEE FOR YOURSELF WHY THEY GIVE YOU MORE THAN ANY CONTROLS YOU CAN NAME

The **CLARK CONTROLLER** *Company*

compare

see for yourself why...

NEW Clark Push Buttons with exclusive wipe action contacts give you more

WIPING CONTACTS—a Clark Controller exclusive—assures minimum contact resistance at all times. As contacts close, unique Clark design creates a sliding action that wipes faces clean of dust and oil.

DUAL COLOR-CODING—buttons and ferrules—in many separate colors, makes possible advantageous color-coding of stations both by individual operating function and group function.

THREE TYPES OF UNITS offer greater flexibility for any application:

- Type HO Oiltight—Panel or Base Mounted
- Type H NEMA I—Base Mounted
- Type H NEMA I—One Hole (Panel) Mounted

The new Clark Push Button line includes a complete range of buttons, selector switches, pilot lights and push-to-test lights or lighted push buttons—available as individual control units or mounted in enclosures or on flush plates.

compare

see for yourself why...

Clark Type "CY" Starters give you more than any other A-C magnetic starter

Whatever your basis for comparison let your own performance check show you how Clark Type "CY" Starters outperform all other starters—give you more.

DEPENDABILITY? Compare the Clark Type "CY" Starter in the toughest application you can find—then see for yourself how it continues to operate dependably where other starters fail.

LONGER OPERATING LIFE? Make your own comparison life test—then see for yourself how much better a Clark Type "CY" Starter holds up under any operating conditions.

OTHER ADVANTAGES? Your own comparison tests on installation, maintenance, and any other requirements, will let you see for yourself that the Clark Type "CY" Starter gives you more than any other A-C magnetic starter in every area of importance.

Clark Type "CY" Starters are available in many combinations, in sizes 0 thru 4, and in a variety of enclosures and forms to meet every industrial application.

More for your money with

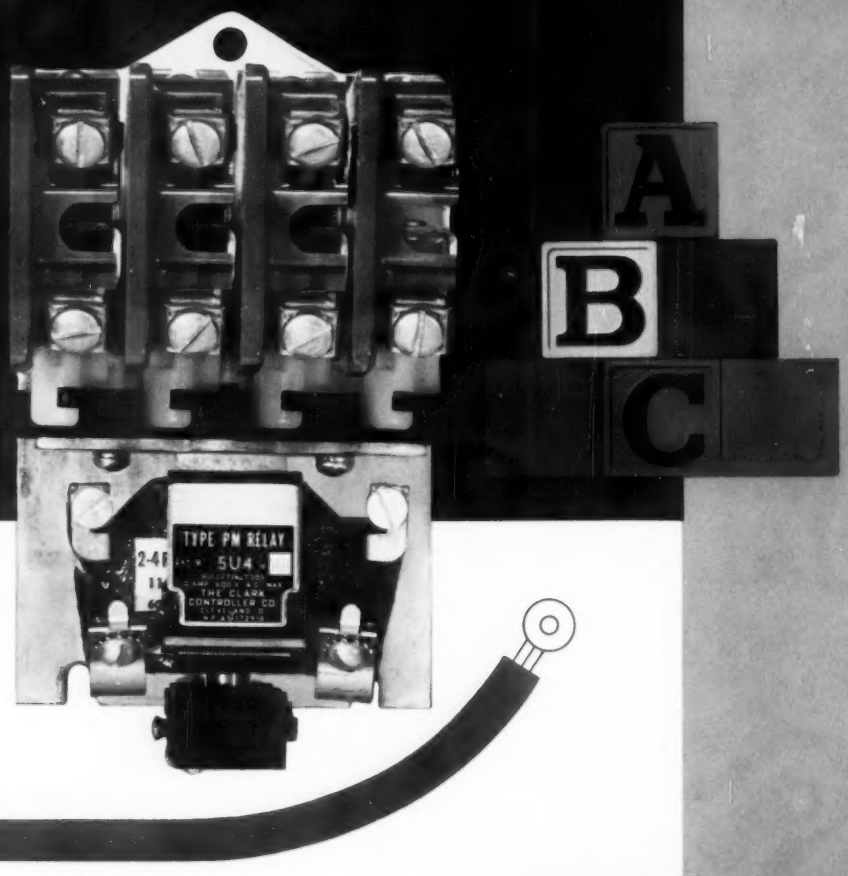
CLARK PUSH BUTTONS

DEMONSTRATION? Ask your local Clark distributor or district sales representative for a demonstration and free literature on the new push button line. Or, write direct to The Clark Controller Company.

More for your money with

CLARK STARTERS

MORE INFORMATION? Your local Clark distributor or district sales representative will be glad to help you set up your own comparison tests. Ask for literature on the complete Clark Type "CY" Starter line, too. Or, write direct to The Clark Controller Company.



compare

see for yourself why...

Color-coded conversion kits help solve any relay circuit problem with building-block simplicity

New color-coding of conversion kits by function now makes it possible for relay users to take even greater advantage of the versatility and flexibility of the complete, integrated line of Clark "PM" Relays.

Basic relays are easily modified on the job with a few simple conversion kits to give you a virtually unlimited number of circuit arrangements on convertible pole, universal pole, latch and time-delay relays.

The "modular construction" of all relays in the Clark "PM" line insures integrated uniformity, compactness and flexibility. Functional alignment in mounting results in neater, more uniform panels and most efficient utilization of valuable space.

More for your money with

CLARK RELAYS

COMPLETE INFORMATION on Clark color-selective conversion kits is available through your local Clark distributor or district sales representative. Or, write direct to The Clark Controller Company.

The
CLARK CONTROLLER *Company*

"Everything Under Control"

Main Plant: *Cleveland 10* • **Western Plant:** *Los Angeles 58*
In Canada: *Canadian Controllers, Limited, Toronto*

(81) LIGHTNING ARRESTERS, Type F intermediate class, are illustrated in Bulletin LA4. Units described are rated from 20 through 121 kv. Line Material Industries.

(82) TRANSFORMERS. Bulletin 61B-8222B describes dry-type transformers in ratings 3 through 50 kva, single-phase, 600 volts and below. Allis-Chalmers.

(83) LIGHTING STANDARDS and accessories designed for supporting larger and more efficient luminaires for street and highway applications are covered in new Catalog ALS-5, 16 pages. Pfaff & Kendall.

(84) INSTRUMENT TRANSFORMERS for metering and related applications, rated from 2.5 to 12.5 kv and 10/5 to 5000/5 turns ratios are described in Bulletin 3-1.2, 4 pages. Associated Research, Inc.

(85) METAL FRAMING construction and maintenance handbook. New 36-page booklet gives application and installation information, specifications, and methods of attaching to structures. Unistrut Products Co.

(86) GLASS FOR LIGHTING. New 4-color brochure gives examples of recent applications of glass in lighting installations. Corning Glass Works.

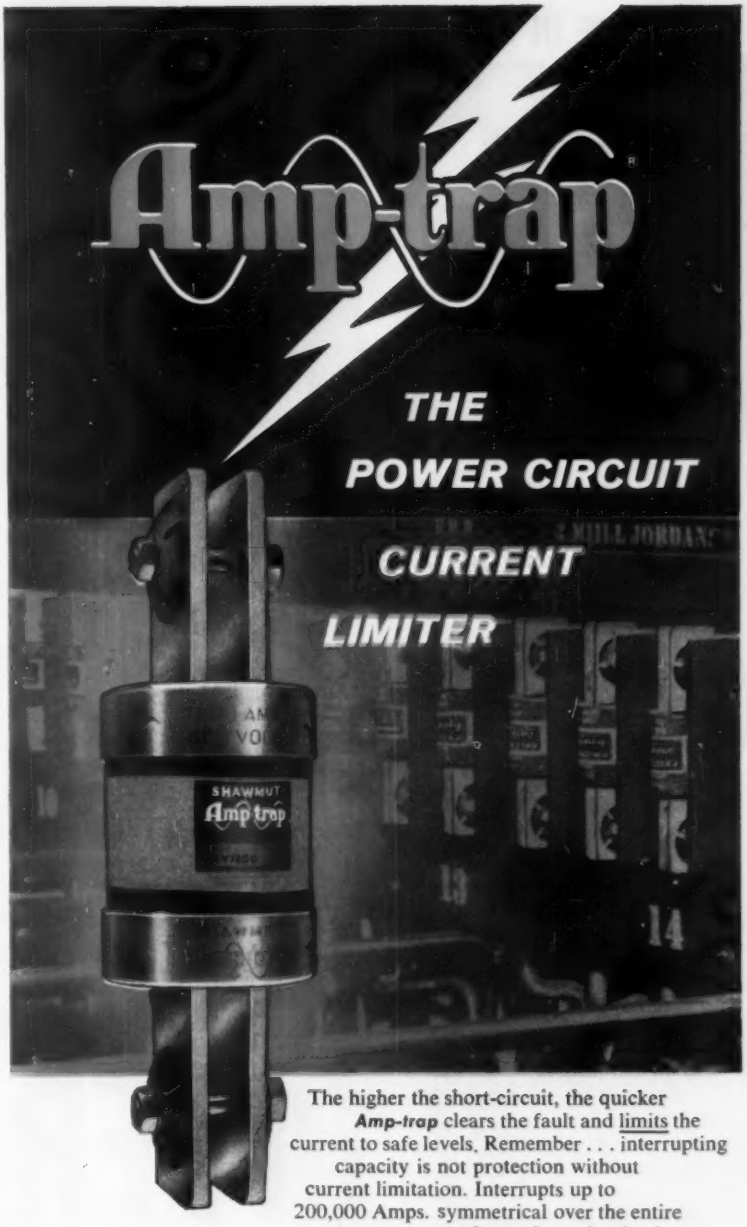
(87) AUTOMATIC SIGN CONTROL. 1-page stuffer designed to help explain and sell timing devices for neon and incandescent signs and displays describes standard and heavy-duty timers plus rain-tight case. International Register Co.

(88) ALUMINUM—how it's used in electrical conductors. New booklet answers the most-often-asked questions on the use of aluminum in electric wire and cable. Reynolds Metals Co.

(89) LIGHTING LENS. Bulletin L-122-M-1 gives complete information on new tempered square convex lens for general area lighting in such places as schools, public buildings, and security institutions. Corning Glass Works.

(90) PRECAST CONCRETE FLOOR and roof slabs—how they were used as raceways for power, telephone, signal, and other low-voltage wiring in new 10-story office building. 6-page folder. Flexicore Co., Inc.

(91) RELAYS. Bulletin ARSP-8, 4 pages, illustrates and lists over 115 general-purpose and specialty relays available from stock. Elgin National Watch Co.



The higher the short-circuit, the quicker ***Amp-trap*** clears the fault and limits the current to safe levels. Remember . . . interrupting capacity is not protection without current limitation. Interrupts up to 200,000 Amps. symmetrical over the entire Ampere range. Stops short circuits short. Anticipates and prevents destruction before it can occur. Faster than any ordinary fuse.

Use ***Amp-trap*** on all general power circuits, DC circuits, Networks, Entrance Switches, Busways, etc. Be safe, not sorry — ask for, get and install ***Amp-trap***.

There is one for every purpose. Write today.

Amp-trap® – "Awake At The Switch"

THE CHASE-SHAWMUT CO.

374 MERRIMAC STREET • NEWBURYPORT, MASSACHUSETTS

Subsidiary of I-T-E CIRCUIT BREAKER CO.

REGISTERED UNITED STATES PATENT OFFICE Est. 1893

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*TRADE IN YOUR OLD VOLTAGE TESTER!

READ

voltage and amperage in a snap!

A voltage "indication" doesn't give you all the information you need to do a job right. You want a precise voltage *reading*, measured on a calibrated scale... and you get it with the AMPROBE JR. But sometimes voltage is only half the story. Most jobs require an accurate *current* reading too. The pocket-size AMPROBE JR. provides it – in a snap – *without* interrupting service! Why settle for anything less?

*SPECIAL OFFER

Trade up to an AMPROBE JR. *now*. For a limited time only, we'll give you a sturdy leather case plus the AMPROBE ENERGIZER (to multiply the JR.'s sensitivity *ten times)*—an *$8 value*—for *only $1* and your obsolete voltage tester! The leads come with the JR. Snap up this offer today—at your distributor.

Amprobe Jr.®
snap-around volt-amp tester
$19.85

PYRAMID INSTRUMENT CORPORATION, LYNBROOK, NEW YORK
Serving the Electrical Testing Needs of Industry

(92) POST INSULATOR. 4-page Bulletin 1481-H illustrates and describes several sizes of insulators for horizontal mounting, suitable for application on 34.5- to 69-kv systems. Ohio Brass Co.

(93) SECONDARY BATTERIES. New 10-page brochure describes rechargeable siver-zinc Silvercel batteries. Yardney Electric Corp.

(94) CIRCUIT BREAKERS for industrial electronic systems. 8-page catalog gives information for selection of standard and miniature thermal units as well as push-pull and toggle types, 1 through 50 amps. Wood Electric Corp.

(95) MULTI-OUTLET SYSTEM. New engineering data folder describes 2-piece, all-steel raceway, including information on wire capacity, methods of fastening to various surface types, and fittings and devices. Wiremold Co.

(96) TRANSFORMERS. Bulletin GEA-6832A, 8 pages, describes full line of oil- and Pyranol-filled distribution equipment transformers, rated from 112½ to 2500 kva. General Electric Co.

(97) SWITCHGEAR. Bulletin 2801-2A, 20 pages, describes redesigned line of 4160-volt metal-clad stored energy switchgear in ratings through 3000 amps and 250 mva interrupting capacities. I-T-E Circuit Breaker Co.

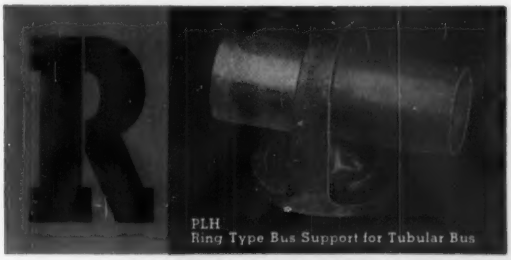
(98) ENCLOSURES for circuit breakers in explosion-proof, dust-tight, and weather-proof designs are covered in Catalog 17. Killark Electric Mfg. Co.

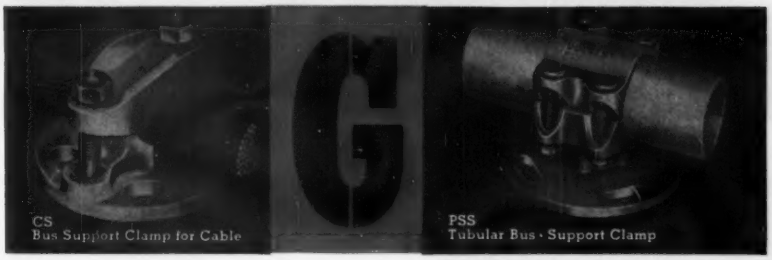
(99) ARC INHIBITORS. Bulletin 9600, 2 pages, gives electrical characteristics and dimensions of inhibitors designed to suppress arcs and absorb voltage surges on dc controllers. Square D Co.

(100) ALUMINUM CONDUIT. Physical properties and performance factors of rigid aluminum conduit are compared to steel conduit in indexed charts, tables, and text in new 32-page manual. Kaiser Aluminum & Chemical Sales, Inc.

(101) FLUORESCENT LIGHTING. 4-page brochure describes new and complete lines of Slimline and Strip Line fixtures. Moe Light Div. Thomas Industries Inc.

(102) BALLAST GUIDE, ATC-110, includes complete listings on thermally protected, weatherproof, and SHO, VHO, and Powergroove ballasts. Advance Transformer Co.





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These Dossert Bus Supports are made of a high tensile strength cast bronze alloy and are equipped with silicon bronze bolts and nuts, making the entire unit completely non-magnetic. Available for all sizes and types of busses. Dossert Bus Supports can also be furnished in Coupling, Tee Connecting, Elbow Connecting, Tee Coupling and Expansion Connection types.

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NEW SERVICE ENTRANCE EQUIPMENT

200-AMP CAPACITY... CIRCUIT BREAKER CONVENIENCE ... AT A COMPETITIVE COST

You will like the extra convenience of Heinemann's new 200-amp service entrance equipment . . . and so will your customers.

Trim, compact, smaller than comparably rated fused pull-outs, these units offer considerable savings in terms of easier installation and more efficient operation.

Installation features would make an apprentice happy. Wiring space is plentiful . . . connections are easily made with solderless screw-type connectors . . . knockouts are placed so that you can run-in conduit from any angle.

Completely non-thermal, the *magnetically* actuated Heinemann circuit breaker eliminates nusiance tripping and other temperature-caused troubles. You can therefore locate the unit wherever most convenient . . . next to heat lines or out in the hot sun, if necessary. The breaker will always carry full rated current, will always trip as specified.

Breaker protection provides other conveniences as well: no bothersome fuse changing, simplified switching: the switch handle has only two positions: ON and OFF. No reset position; no confusion possible.

Rated at 120/240V AC, two or three wire service, the new Heinemann service entrance equipment is available in outdoor or indoor enclosures. Both are of heavy-duty steel in a grey baked enamel finish. Outdoor enclosures are raintight, with hinged covers that may be padlocked against tampering.

You'll be pleasantly surprised by the cost. It's little more than that of comparably rated fused equipment.

For full information send for Bulletin 1003

HEINEMANN
ELECTRIC COMPANY
132 Plum Street, Trenton, N. J.

Circuit breakers

S.A. 1959

Reader's Quiz

QUESTIONS from readers on problems of industrial equipment, installations, maintenance and repairs. Answered by electrical maintenance engineers and industrial electrical contractors out of their experience. For every question and every answer published we pay $5.00.

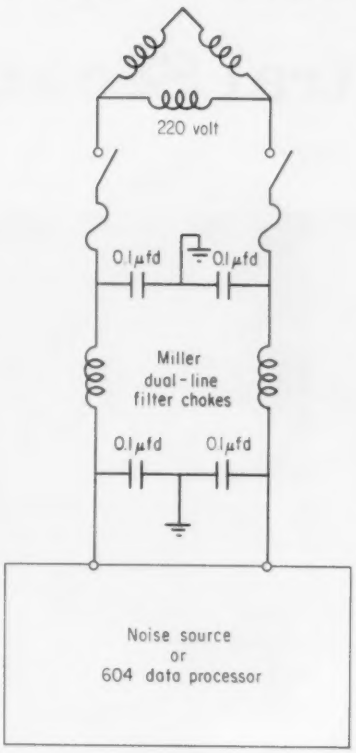
Data Processing Machine Supply

QUESTION E38—Our two IBM-604 data-processing machines have been making errors which we feel are due to the power supply. The 220-volt single-phase service for the machines are taken from a 3-phase, 220-volt ungrounded-delta substation. An oscilloscope placed across the input to the IBM machines shows occasional spikes of very short duration and 50 volts or more in magnitude. We have been unable to locate the source of this "noise" because of its infrequent nature. I would be interested in knowing what other readers have been using for data-processing machine supplies, and also whether or not a band-pass or low-pass filter network would work for this application. If so, how would you design the parameters?—I.G.B.

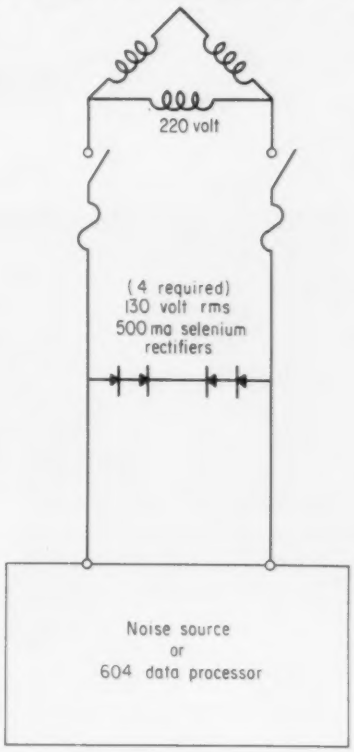
ANSWER TO E38—We have two IBM calculating machines and had the same trouble that I.G.B. describes. Our machines were connected to a 4800/208-volt, 3-phase, 60-cycle transformer. They both were connected to the same electrically operated substation breaker, but each was protected by an E frame. 277-volt, plastic-type breaker. The breakers seemed to be very hot, indicating poor contact pressure. We also suspected that there was some arcing that caused the voltage transients.

We replaced the plastic breakers with fused disconnects and have had no trouble since.—H.E.H.

ANSWER TO E38—Try a harmonic-free constant-voltage transformer, if you are sure that all the tubes or transistors, condensers, and resistors are not at fault. These machines are some forms of amplifiers which use a dc filtering system, so that the 50 or more short voltage spikes will not pass a good filtering system. The filament voltage is also protected, but if IBM insists on perfect voltage and expects you to improve the input voltage and current, then I would suggest that you check the input voltage and current of all machine parts to see if the machine has to be serviced every five years or more often.—H.S.



Oscillatory noise



Single "Spike" noise

ANSWER TO E38—One of the fundamentals in noise suppression is the suppression or elimination of the noise at the source. Every effort should be made to locate the source of the noise. A portable radio may help in this regard as a noise locator.

One possibility that should not be overlooked is that one data processing machine or associated components may be producing the noise.

If the noise source can be located, and if oscillatory in nature, then LC low-pass filters should be inserted in the line as close as possible to the noise producer.

If the source cannot be located then LC low-pass filters should be inserted in the line to each 604, again as close as possible to each machine.

Miller dual-line filter chokes D7829, rated at 30 amps, may be used if they can handle the 604 load, together with 1/10 microfarad 600-volt oil-filled condensers, to make experimental filters.

Commercial radio interference filters are available from Filtron Corp., Flushing, N. Y., and All-Tronics Inc., Westbury, L. I.

If the noise is a single spike, not oscillatory, an experimental peak suppressor may be made up of several selenium rectifiers, back to back, across the line. Commercial suppressors are available from Bradley Laboratories, New Haven, Conn. See sketches above.—J.B.

Starting Synchronous Motors

QUESTION F38—In our plant we have a 40-hp, 2300-volt, 3-phase, 60-cycle synchronous motor, excitation 110 volts. This motor drives an ammonia compressor and it has automatic synchronizing equipment.

When we start this equipment, it turns over and has a heavy growl. It accelerates in speed, growling and vibrating continuously. In about

Mr. Jerry Shaw of Shaw Electric, electrical contractor for Justice Elementary School, Justice, Illinois, says:

"Honeywell helped us install Central Security System

Mr. Jerry Shaw, in one of the classrooms in Justice Elementary School. Automatic detectors in the classroom will detect fire without fail and immediately ring alarms in the building and at the fire station.

our first without a hitch"

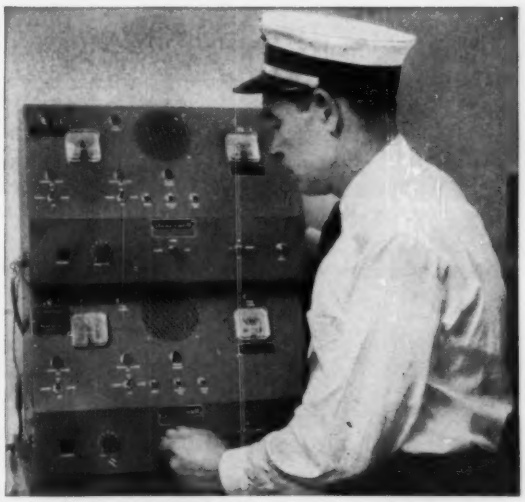
Honeywell planned the system for Justice Elementary School down to the last detail—then supervised its installation and checked it out to make sure it operated perfectly.

"This was our first attempt at installing a Central Security System," says Mr. Shaw. "And with Honeywell's help, it went off without a hitch. Honeywell engineers saw that the equipment was delivered on schedule and not only supervised the installation, but stayed on to check it out."

The Honeywell Central Security System in Justice Elementary School protects the building against both fire and vandalism. Twenty-two automatic fire detectors are located throughout the school. They detect fire when it breaks out and automatically sound alarms to clear the building and notify the fire department.

The system also includes Honeywell intrusion detectors, installed at key locations in the building. They detect intrusion and automatically sound an alarm at police headquarters. In addition, the system provides intercommunication between the school and police headquarters to enable the police to listen for suspicious noises.

You'll find your job always goes smoothly when you work with Honeywell. Help is conveniently available from any of the 112 offices across the nation. Call your local Honeywell office. Or write Honeywell, Dept. EC-9-150, Minneapolis 8, Minnesota. In Canada, write Honeywell Controls, Limited, Toronto 17, Ontario.



Mr. Joseph M. Stimatz, Chief of the Justice Fire Department, operates the Honeywell Central Security Panel at fire and police headquarters. Both fire and intrusion will automatically be reported here so that help can be dispatched without delay.

Honeywell

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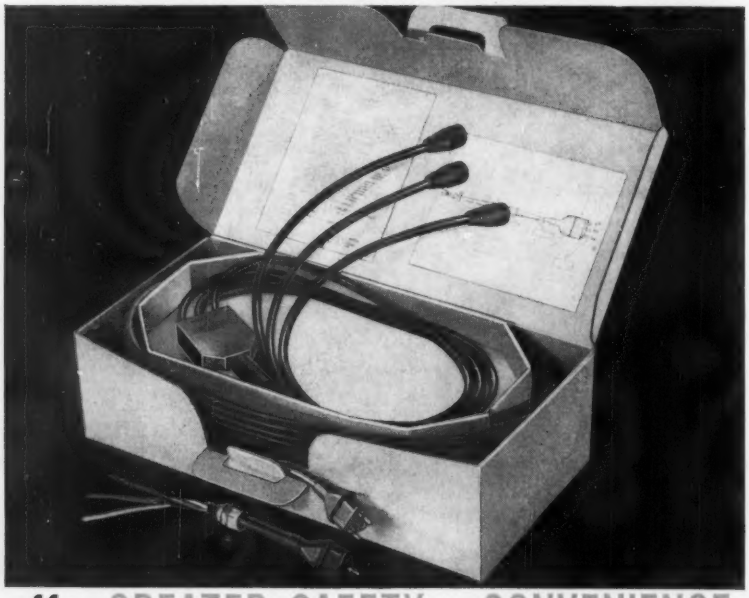

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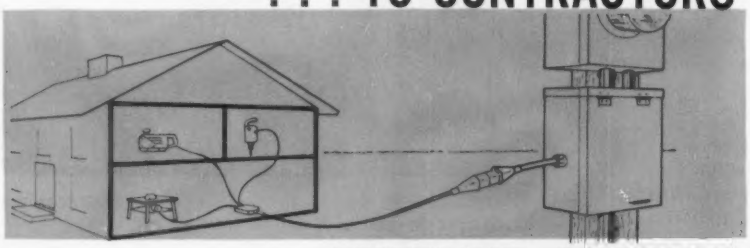

TUFFLINE DIVISION

WB WHITNEY BLAKE CO.

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five minutes after starting, it reaches 92% of synchronous speed and latches in and runs without a growling noise. The air gap is 0.055 and symmetrical throughout. The motor has 0.015 whip.

Can someone tell us what is wrong with this motor?—C.P.

ANSWER TO F38—Assuming that this synchronous motor, which incidentally is a very small motor of the synchronous design, was designed and is adaptable for this ammonia refrigeration application, requiring exceptional high-starting, pull-in- pull-out torques, C.P. should first check into the electrical components, such as automatic unloader, automatic by-pass valve, capacity control, because any of these automatic controls impaired or inoperative could be the cause of the long five agonizing minutes of growling and vibrating to bring this motor and compressor up to speed. In the event the above mentioned items check out OK and with the air gap symmetric and only 0.015 whip, which stems from the reciprocating action of heavy ammonia compressor, you should then check into the increment-starting, star-delta starting equipment whichever may be the case. And last but not least, check into the amortisseur winding, because synchronous motors are not considered self-starting, and any small defect in the above could delay bringing the rotor nearly up to synchronous speed at which point then dc current is automatically applied and the motor pulls into synchronous speed.

However since there is so much at stake, you should consider calling in the service engineer of the electrical equipment.—C.B.

ANSWER to F38—In starting compressor loads, whether using synchronous or induction motors, there should be some form of unloader on the compressor which will allow the motor to accelerate to full speed within seconds before applying the compressor load.

Five minutes is entirely too long for any motor to growl and vibrate in attempting to get up to full speed. If you are sure that there is not an unloader on the machine, or it may be inoperative or never hooked up, then contact your compressor manufacturer for information as to the correct method to tie one in to the compressor.

An unloader merely provides a by-pass between the suction and discharge sides of the machine, pre-

Gibson Fixtures Give You
More Than Good Lighting...
Much More!

FOXBORO GOES TO GIBSON FIXTURES FOR LOW-COST INSTALLATION AND MONEY-SAVING FLEXIBILITY

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"Gibson lighting fixtures offer distinct advantages in installation and maintenance," reports an official of The Foxboro Company which uses Gibson fixtures throughout its new assembly building.

"Our Gibson fixtures," he says, "were installed faster and at lower cost than any others we have used. The fact that these fixtures can be plugged in and un-plugged like an electric appliance means that they can be quickly re-spaced to accommodate changes in plant layout and can be dismounted instantly for servicing without distracting production workers."

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THAT JUST
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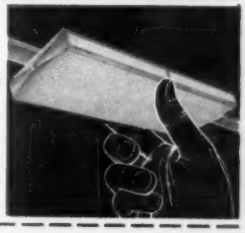

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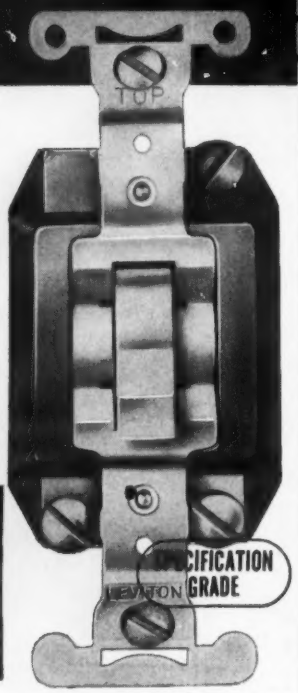

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venting compression until the motor has had time to accelerate to full speed.

An auxiliary contact on the field-applying contactor may be used to operate the unloader, usually a solenoid valve; or a time-delay set to operate just after synchronization will also suffice. In either case, the unloader should be energized at the same time the motor is started and then tripped off after full speed is attained, allowing the compressor to start pumping.

If starting is infrequent and non-automatic, a hand-operated valve could be used for the unloading.—R.M.K.

ANSWER TO F38—I have found the same symptoms on several synchronous motors. If you will dismantle the motor and inspect the squirrel-cage winding on the field piece (rotor) you will probably find that the end ring is not fastened to the winding properly, either welded or bolted.

This is usually caused by an excessive overload or a prolonged starting period.

I hope that this information will help answer your question and cure your problem.—W.B.W.

Lamps for Temporary Lighting

QUESTION G38—I would appreciate the opinion of others as to whether it pays to use "rough-service" lamps on temporary lighting of buildings under construction.

Strings of lights are sometimes moved around, and water often drips on the bulbs. Vibration and wind can also enter into the problem.

Rough-service lamps usually cost at least twice as much, and they are not quite as efficient in the amount of light they give.

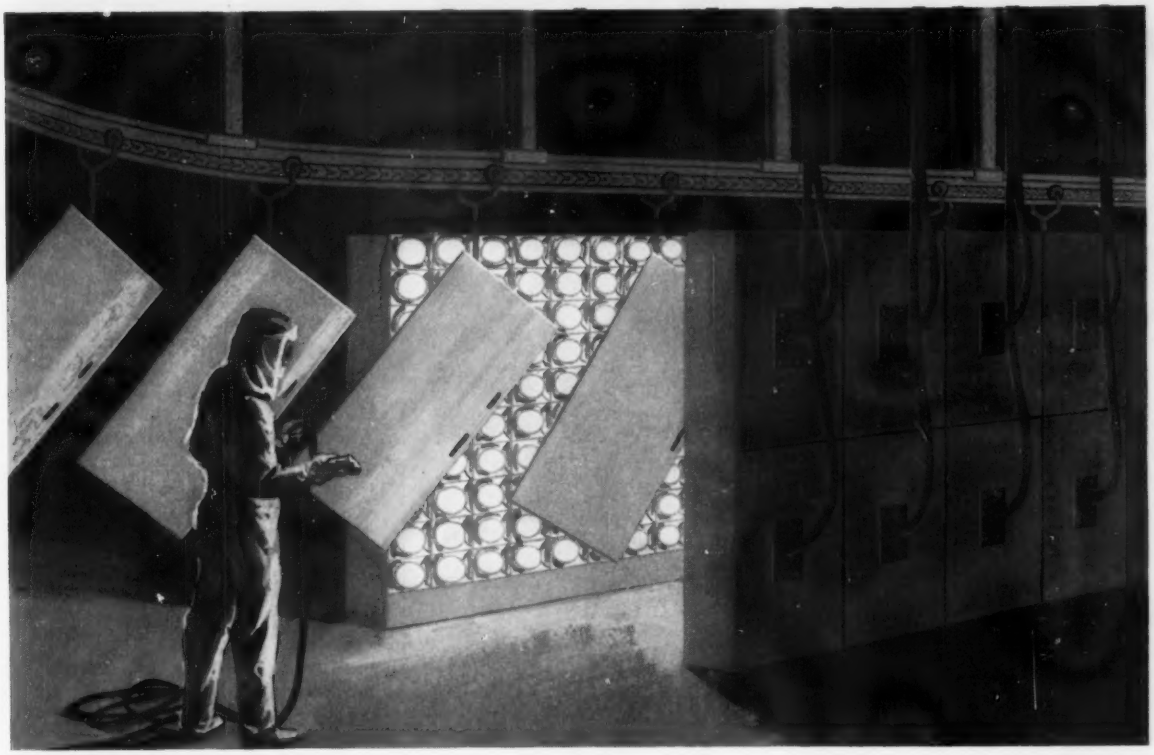
I have used both kinds, but still cannot answer the question as to which is the better method.—M.C.T.

ANSWER TO G38—We have made many lengthy and profitable tests along this line and arrived at these facts.

Special long-life lamps give up to 500% longer life than the so called "rough-service" lamps of three other leading lamp manufacturers, while the lumen output remains very steady and approximates the lumen output of other standard lamps.

SILICONE NEWS from Dow Corning

Use This Cable Plant-Wide



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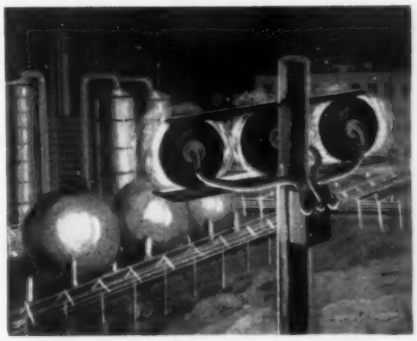
You can eliminate the extra expense of stocking many specialty wires and cables. How? By specifying Silastic®, the Dow Corning silicone rubber.

Silastic is more than a match for many of your plant's toughest service conditions. First of all, you can count on Silastic to give reliable service in or near ovens, boilers, fans, blowers and other "hot" applications where temperatures go up to 260 C. This cable covering resists the torture of high temperature aging, overloads or sudden power surges. Stays rubbery . . . it won't crack to allow electrical failure. And there's no brittleness even at —90 C . . . so you can flex Silastic insulated cable in bitter cold, too.

What's more, this versatile wire and cable insulation resists year 'round outdoor weathering . . . won't harden, crack or check. At a south Florida test station, Silastic samples showed no signs of weather deterioration after more than 9 years of continuous exposure.

Leading manufacturers now offer power cable, control cable, hookup wire, fixture wire and building wire with insulation of Silastic.

TYPICAL PROPERTIES OF SILASTIC FOR WIRE	
Temperature range, °F	—130 to 500
Insulation resistance, megohms/1000 ft.	1000 to 3000
Electric strength, volts/mil	300 to 500
Dielectric constant, 10^2 cycles per second, nominal	3.2



For new booklet on how to save with Silastic insulated wire and cable and list of suppliers, please address Dept. 2809.

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For 2½", 3", 3½", 4" Pipe and Conduit

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The Ridge Tool Company, Elyria, Ohio, U.S.A.

The fact that the cost of the lamp is higher, really, is only a small part of the picture. The time and labor necessary to replace the lights is the expensive part (in this country, that is) so when you have to replace the "rough-service" type four to five times as often as the long-life the answer is obvious, and our experience has proved it.—H.N.W.

ANSWER TO G38—There are many facets to your question. I would say that in general for use on extension cords or in any service where excessive shocks may be encountered, rough-service lamps should be used. But, we have found that on many construction jobs we had far superior results with rigidly mounted sockets and used PAR and R bulbs that are resistant to breakage from rain or snow. Rigid mounting eliminates the vibration. Give this a try.—J.A.M.

ANSWER TO G38—It is my opinion that it ordinarily does not pay to use "rough-service" lamps for temporary lighting of buildings under construction for the following reasons:

1. As M.C.T. states, "rough-service" lamps usually cost twice as much as ordinary lamps and are not as efficient from a lighting standpoint as standard lamps.
2. "Rough-service" lamps are sometimes hard to obtain and, even when purchased in a very large quantity on a wholesale basis, the savings would not start to compare to standard incandescent lamps at wholesale prices.
3. The replacement factor may or may not be greater for standard lamps, depending on (a) environment, (b) voltage used on the lamps.

Under the conditions of operation stated by M.C.T., I cannot see where "rough-service" lamps would justify their added costs.—E.J.M.

Can You Answer These QUESTIONS?

QUESTION P38—In our plant we have 220- and 440-volt, 3-phase delta ungrounded circuits for conveyors. These circuits have a static voltage that builds up to the circuit voltage on all three lines. What do you recommend to keep this static voltage off of the lines? It is harmless except when making tests on circuits when they are hot.—C.H.K.

QUESTION Q38 — For a special fluorescent cove-lighting system, the ballasts should be located remote, on a wood wall. Can they be mounted directly on the wall, or do the ballasts have to be enclosed in a sheet steel box? How big should the box be to enclose two single-lamp ballasts? The lamps are 40 watt, rapid start, G.E. No. F40/WWX; the ballasts are G.E. No. 89G325, low power factor.—J.A.

QUESTION R38—A feed mill is served with a 3-wire, 3-phase, 480-volt ungrounded type of service from a bank of three 50-kva transformers connected wye-delta with a floating neutral on the high side. Trouble developed such that the 3-phase, 440-volt motors would not run although the few small 115-volt single phase motors and lights did work. They were served from a 440/110-volt single-phase dry-type transformer located in the building.

Voltage readings at the service disconnect switch were roughly 480 volts between all phases, except that when an attempt was made to start a 3-phase motor, one phase would drop to almost zero. The voltage readings to ground were extremely unbalanced, one phase wire to ground causing the voltmeter to slam against the peg on the 750 volt scale, and after several readings flashed over on the inside of the meter.

Continued investigation revealed that a terminal on the end of a coil on the low-voltage side of one of the 50-kva transformers had burned open inside of the transformer. This terminal was reconnected and everything went back to normal.

Where did the high voltage come from between one leg and ground that burned out the voltmeter?—R.B.F.

QUESTION S38 — We have been told that motors that have epoxy encapsulated windings cannot be stripped for rewinding in case of winding failure. If this is the case, then how are these motors rewound? We would greatly appreciate any discussion on this subject, as we now have many motors with epoxy encapsulated windings and are in the throes of purchasing more.—J.A.M.

PLEASE SEND IN YOUR ANSWERS BY OCTOBER 15

For General Use buy RIDGID Heavy-Duty Pipe Cutters

Factory tested for perfect tracking, here's your best cutter buy for hand use. Extra-long shank protects threads, gives fast, easy adjustment. Large handle for sure grip . . . more leverage. Strong, special malleable frame won't bend or warp. You'll also need the RIDGID Wide-Roll Cutter, that tracks perfectly at high power-drive speeds, and the RIDGID 4-Wheel Cutters, that give quick, clean cuts in tight places with only quarter turns.

For Tubing and Thin-Wall Conduit buy RIDGID Tubing Cutters

Exclusive fold-in reamer on Nos. 10, 15 and 20 protects hands and pockets . . . reams full cutter capacity. Thin-blade wheel gives quick, clean cuts. Rollers smooth tubing ready for soldering. Special RIDGID No. 315 3-Wheel Cutter gives fast cuts in hard-to-get-at places.

There's a RIDGID Cutter to save you time on every job. Call your Supply House today!

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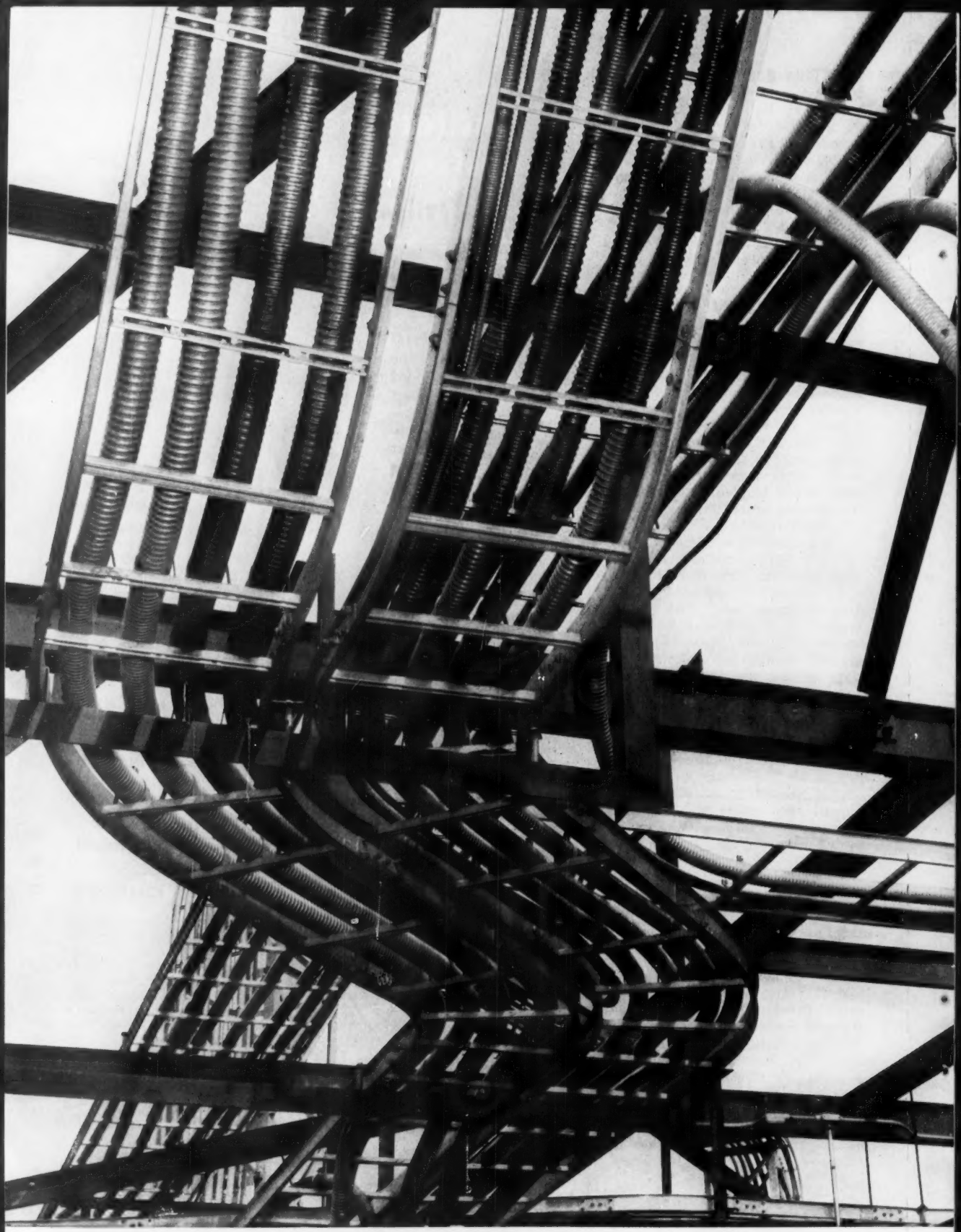
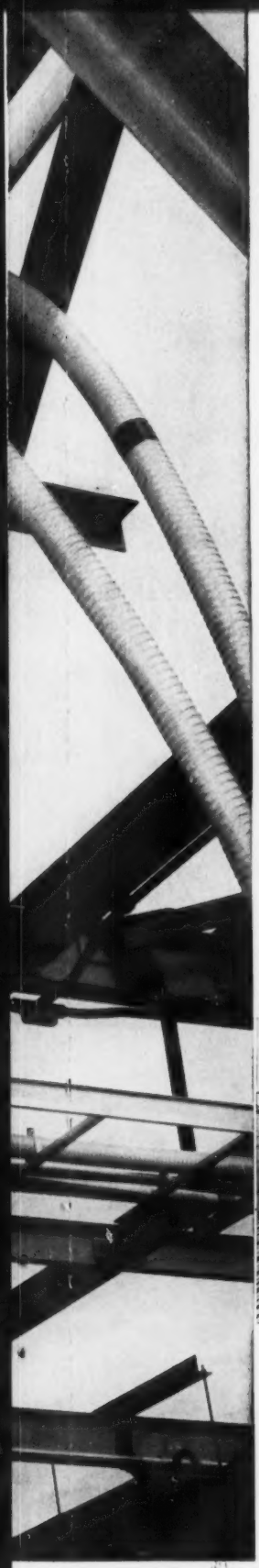


USS Tiger Brand Armorlokt cable in open racks costs less to install, carries more power and can be easily maintained.



Power for new refinery supplied by overhead installation of USS Tiger Brand Armorlokt Cables

Electrical power for this highly automated refinery of the Standard Oil Company (Ohio) at Toledo, Ohio comes into the transformers at 69,000 volts and is stepped down to 4,160 volts for the various power feeders. These are carried to unit substations of the processing plant on racks supporting the USS Tiger Brand Armorlokt Cable. At the substations, the voltage is reduced to 440 volts and from there is run to the starter racks for motors which drive the process pumps.

This is the first time that armored cable has been used in any of Sohio's refineries. The initial cost was less than for a conduit or concrete duct installation in the ground. The cables in air have a higher current carrying capacity for a given size cable. Since heat can dissipate quickly, a smaller cable can be used to carry the same power.

Less costly construction was possible at substations because the Armorlokt Cable was easily accessible from overhead and did not require the construction of conduit openings in a concrete ground slab.

Flexibility. Besides ease of installation, USS Tiger Brand Armorlokt Cable can be readily run around obstructions, because of its flexibility. Capacity can be quickly and economically added for future needs for more power.

Why not investigate USS Tiger Brand Armorlokt Cable—not only for new installations but for bringing old systems up to date with the least cost for installation. Write or call American Steel & Wire, 614 Superior Ave., N. W., Cleveland 13, Ohio.

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A standard cable for every special job

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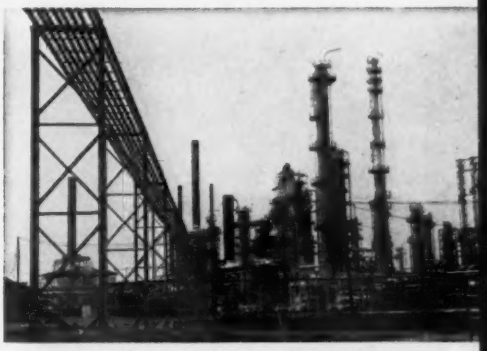
- Paper & Lead Cable
- Varnished Cambric Cable
- Interlocked Armor Cable
- Special Purpose Wire & Cable
- Aerial, Underground and Submarine Cable

Substation showing cable racks supporting USS Tiger Brand Armorlokt Cable with varnished cambric insulation. Sizes include cables of 500 MCM with voltages of 5,000 and 600 volts.



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Questions on the Code

Answered by:

B. A. McDONALD, *New York Board of Fire Underwriters, Rochester, N. Y.*

B. Z. SEGALL, *Consulting Electrical Engineer, New Orleans, La.*

R. E. WARD, *Chief Electrical Inspector, Insurance Department, State of Tennessee, Nashville, Tenn.*

Service Installation—Multiple Occupancy

Q. *Please advise me of your interpretation of the code in this situation.*

Location of service entrance switch.

Building is a one story taxpayer, fireproof.

Location of meter equipment: basement (not used for entrance or exit).

Boiler room is used by dry cleaner and laundry.

Beauty parlor, luncheonette-toy store do not use basement and are the only ones with an entrance from store to basement.

Sewer line crosses entrance door at bottom of stairs about one-third from top.

Switch location was installed outside in enclosure because no room is available inside.

The question is, does switch have to be raintight under these circumstances?

Diagram is shown below for explanation.—H.W.

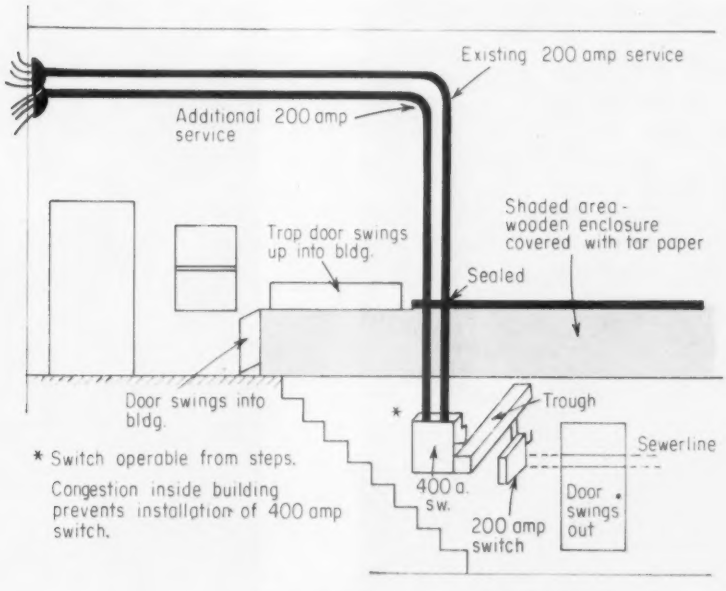
A. A review of the illustrations submitted indicates that the new 400-amp, 3-phase, 4-wire service switch has been installed in an outside stair-well leading to the basement in the building. It is enclosed by a wooden structure with tar-paper roofing. Access to the stair-well is through door openings leading into some of the stores. The structure is a one-story multiple-occupancy building serving four stores. Access from the stair-well to the basement is through a door opening, partially obstructed by a sewer line located one-third the length of the door from the top of same. Customer's metering equipment and his individual disconnect are located in the basement. We have used only one of the illustrations submitted to cover the details involved.

The specific question raised concerns the new 400-amp main switch. Should it be raintight? As covered by code definition, should it be "So constructed or protected that exposure to a beating rain will not result in the entrance of water."

Since the switch is installed in a stair-well, which is totally enclosed, it is quite obvious that it will not be exposed to a beating rain. As a result, it appears that a raintight switch is not required by the code. If the outside wooden structure enclosing the stair-well does not adequately deter the entrance of water and snow, we may have a damp location, but I doubt if it would be classified, as defined by the code, as a wet location. Section 380-4 requires a switch located in a wet location to be enclosed in a weatherproof enclosure or cabinet. If it is considered to be a damp location the provisions of Section 373-2 apply. Such conditions may only be properly determined by the authority enforcing the code in line with existing circumstances.

Another factor which could enter the picture concerns the local building code which may not permit the 400-amp switch to be located in the stair-well. Since the basement is occupied by the dry cleaner and laundry there could be a question with respect to local exit requirements, and the sewer line located directly in the path of exit may likewise be subject to criticism. Perhaps there should be a door on the enclosure leading directly to the outside. Such questions are beyond the scope of the code, and the building inspector should be consulted.

In addition to the above comment, the provisions of Section 230-75 require each occupant, in a multiple occupancy building, to have access to his disconnecting means. When access is only available through another tenant's occupancy, a question immediately arises with respect to this code rule. Is there an agreement whereby each occupant will have access to his meter, disconnect and overcurrent devices located in the basement? If not, there appears to be a code violation. —B.A.McD.—9/60/1


Existing 200 amp service
Additional 200 amp service
Trap door swings up into bldg.
Shaded area - wooden enclosure covered with tar paper
Sealed
Door swings into bldg.
Trough
Sewerline
* Switch operable from steps.
Congestion inside building prevents installation of 400 amp switch.
400 a. sw.
200 amp switch
Door swings out

Fluorescent Lighting Fixtures

Q. *Will the code permit fluorescent lighting fixtures on 50-amp circuits?—J.D.B.*

A. No. Section 220-21a states that lampholders, when connected to circuits having a rating of over 20 amps shall be of the heavy-duty type. In the 1956 National Electrical Code under Section 3114 a new definition of heavy-duty lampholders was given. This new definition establishes the limi-

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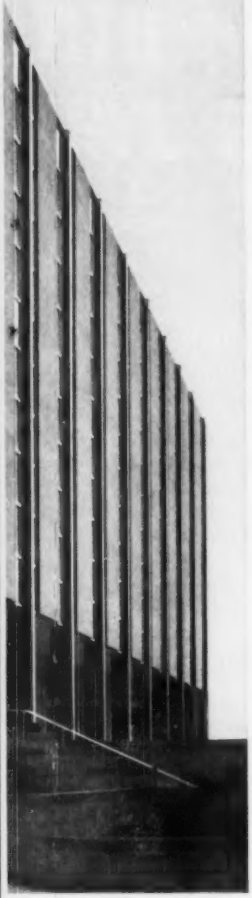

Architect and Engineer: Leo A. Daly • Electrical Contractor: Sachs Electric Corp.

How Day-Brite lighting "sells" reading in the new Pius XII Memorial Library

From the architect's first draft to the final choice of curtains, St. Louis University's modern new library was planned with one goal in mind: to encourage students to *use* it.

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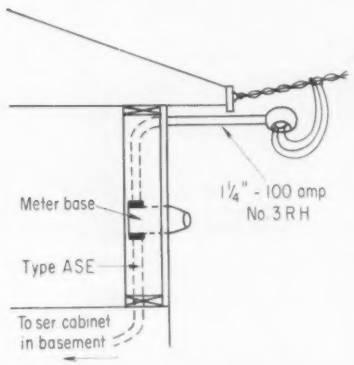
tation of fluorescent lamps to 15- and 20-amp branch circuits. In this new definition a heavy-duty lampholder is one rated at 750 watts and over. Fluorescent lampholders are rated at 600 watts or less, therefore can only be used on 15- or 20-amp circuits.

There is an exception to this rule in the use of the admedium lampholder which is used on mercury lamps, such being called heavy-duty lamps.—R.E.W.—9/60/2

Concealed Service Entrance Conductors

Q. *In a city that I had the opportunity to visit this past summer I saw dozens of homes in a newly established sub-division with service entrances installed as shown in the diagram below.*

As indicated in the diagram, the homes are wood-frame construction. Service conduit is run concealed between 2 by 4 studs to meter base. From meter base to service cabinet Type ASE cable is used.



I am very interested in your comments of such an installation insofar as the NEC is concerned.—R.C.M.

A. The provisions of Section 2331 (230-44, 1959 Code) read as follows:

"Installation of Service Entrance Conductors.

"230-44. Wiring Methods. Service entrance conductors extending along the exterior, or entering buildings, may be installed as separate conductors, in cables approved for the purpose, or enclosed in rigid conduit, or, for circuits not exceeding 600 volts, in electrical metallic tubing or as busways.

"Fine Print Note. Service entrance conductors should not be run within the hollow spaces of frame buildings unless provided with overcurrent protection at their outer end."

This rule has been in the code for more than 20 years, and at times has been the source of considerable controversy, due to the fact that the fine print note implies that service entrance conductors may be run within the hollow spaces of frame buildings, regardless of overcurrent protection at their outer end. The use of the word "should" denotes permission of a procedure which is not required. It also implies that service entrance conductors could be run in the hollow spaces of masonry construction without any consideration of overcurrent protection at their outer end.

Some inspection authorities, however, contend that such procedure is in conflict with the provisions of Section 2351 (230-70) which require the service disconnecting means to be located at a readily accessible point nearest to the entrance of the conductors, either inside or outside the building wall. In connection with this requirement, the 1959 Code calls our attention to the provisions of Section 230-45 which read as follows:

"Conductors in conduit or duct placed under at least 2 in. of concrete beneath a building, or buried in 2 in. of brick masonry or in concrete within a wall, shall be considered outside the building."

On the basis of the foregoing rules, some inspectors have refused to accept the procedure shown by the illustration. They contend that the installation of unprotected service entrance conductors, run for a distance of 10 or 15 ft within the hollow spaces of frame buildings, with an additional run of 5 ft or more exposed in the basement, is quite beyond the scope of safeguard intended by the code. They quote the provisions of Section 230-45 (old 2302), coupled with Section 230-70 (2351) as evidence in support of their convictions. They are unable to understand the logic which recognizes the need of a service switch and overcurrent device located at a readily accessible point nearest to the entrance of the conductors, and a rule which would permit 10 to 20 ft or more of unprotected conductors running to such service equipment.

Regardless of the foregoing opinions, an Official Interpretation No. 142 was issued about 1940 which reads as follows:

"Concealed Service-Entrance Conductors.

"Question 1. Does Section 2331, or any other section of the National Electrical Code, prohibit the installation of Type SE service entrance cable concealed in the hollow spaces of frame buildings?

"Finding: No.

"Question 2. Does the fine print note of section 2331 also refer to Type SE service entrance cable?

"Finding: Yes."

While the foregoing interpretation only covers service entrance cable, it appears quite evident that any of the wiring methods recognized by Section 2331 could be installed as shown on your diagram. As a result there appears to be no code violation with the installation under discussion with one exception which concerns the provisions of Section 2337 (230-51) which read as follows:

"To prevent the entrance of moisture, service entrance conductors shall be connected to the service-drop conductors below the level of the service head or the termination of service entrance cable sheaths."
—B.A.McD.—9/60/3

Bonding of Water System

Q. *A feed processing plant is served by a 3-phase 3-wire, 480-volt service from an ungrounded system. A feeder is run from the service equipment to a transformer to obtain lighting service. The transformer is located on the opposite end of the building to the service equipment or a distance of approximately 100 ft. At the main service the switch box, conduit and equipment are grounded to an approved driven ground rod. The lighting transformer neutral is grounded to the water line near the transformer.*

Would Article 250 of the National Electrical Code require the interconnection or bonding of the water system and the driven ground rod?—M.R.L.

A. Yes. Section 250-81 requires that the water piping system always be used as the grounding electrode, if available. I would certainly say such system is available if in the building not over 100 ft distance. I also call to your attention Section 502-3 as most feed processing plants will have an area or areas of Class 2 Division 1 hazardous locations. Section 502-3 states in part:

"Surge Protection, Class II, Divisions 1 and 2. In geographical locations where lightning disturbances are prevalent, wiring systems

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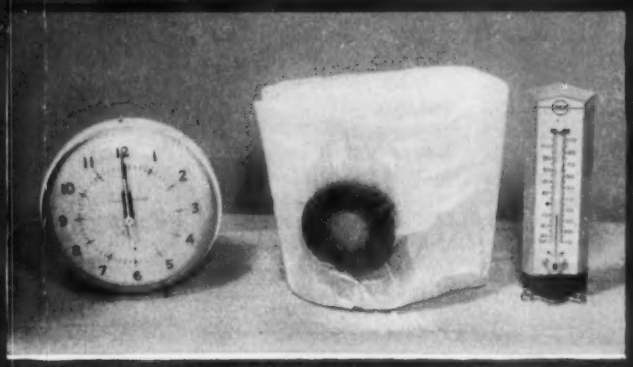

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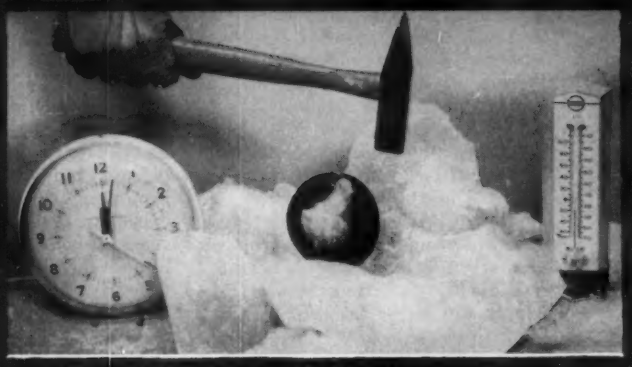

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in Class II locations shall, when supplied from overhead supply systems, be suitably protected against high-voltage surges. This protection shall include suitable lightning protective devices, interconnection of all grounds, and surge-protective capacitors."

A fine print note follows which in part reads as follows:

"Interconnection of all ground should include grounds for primary and secondary lightning protective devices, secondary system grounds if any, and grounds of conduit and equipment of the interior wiring system. For ungrounded secondary systems, secondary lightning protective devices may be provided both at the service and at the point where the secondary system receives its supply, and the intervening secondary conductors may be accepted as the metallic connection between the secondary protective devices, provided grounds for the primary and secondary devices are metallically interconnected at the supply end of the secondary system and the secondary devices are grounded to the raceway system at the load end of the secondary system."

I would have no objection to driven electrodes in addition to the water system as long as all grounding electrodes are properly bonded together. In many instances such recommendations are made and required.—R.E.W.—9/60/4

Well Casings as Grounding Electrodes

Q. *I have a code problem that has bothered me for some time now, and it has been discussed in the meetings of the local electrical contractors, both among the contractors and with the inspectors who frequently attend our meetings, and it always reverts to "the inspector is right."*

The inspectors require that all services in rural areas be grounded direct to the well casing. On all new construction this sometimes means, running the bare ground conductor underground 40 or 50 ft, using a 2-in. ground clamp, and then covering it up with about 5 ft of earth. While we understand that Article 250 in the code says that "an underground water system shall always be used when available," does not that same article say that the ground connection "shall be accessible?" Please give us an opinion on this matter.—G.R.

A. For the convenience of our readers, the provisions of Section 250-81 covering grounding electrodes is quoted as follows:

"A metallic underground water piping system, either local or supplying a community, shall always be used as the grounding electrode where such a piping system is available. Where the buried portion of the metallic piping system is less than 10 ft (including well casings bonded to the piping system) or there is some likelihood of the piping system being disconnected, it shall be supplemented by one or more of the grounding electrodes recognized in Sections 250-82 and 250-83."

The provisions of Section 250-82(c) recognize "other local metallic underground systems, such as piping, tanks, and the like" as grounding electrodes. The 1947 edition of the code, Section 2582(c), specifically recognized a metal well casing as a grounding electrode as follows: "A local underground piping system, metal well casing, and the like." It is significant to note that the recognition of a well casing, as a grounding electrode, is no longer specifically recognized in the code. It also appears important to note that the above quoted Section 250-81 appears to include bonded well casings as part of the metallic piping system.

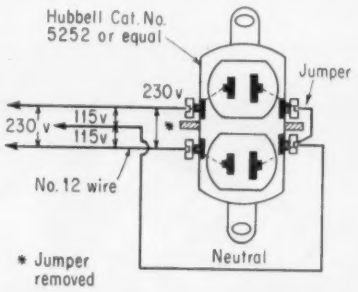
In view of the foregoing, it appears obvious that the 1959 edition of the code does not require the grounding conductor to be brought direct to the metal well casing. A literal concept of Section 250-81 indicates that the grounding conductor must be connected to the local metallic underground water piping system serving the building, with supplementary grounds if necessary. Such a connection usually is made in the building, and many inspectors require the waterpipe to be bonded to the well casing. To me, this is essential since the casing is in contact with damp or wet soil, and the buried portion of the piping may be in dry soil. The fine print note following Section 250-84 indicates that local metallic underground piping systems, metal well casings, and the like, have, in general, a resistance substantially below 25 ohms.

The provisions of Section 250-112 (a) requires the grounding connection to a water pipe electrode to be accessible, **where practicable.** It is also significant to note the following sentence which appears under this Section: "Where the source of the water supply is from a driven well (in the basement of the premises), the connection shall be made as near as practicable to the well." This is further evidence in support of the contention that the code, regardless of the location of the well casing, does not require a direct connection to the casing.—B.A.McD.—9/60/5

Break-Off Feature Receptacle

Q. *Please give me a code ruling on the following:*

Is it permissible to use a Hubbell No. 5252 or equal, duplex receptacle on a 115-230-volt, No. 12, 3-wire branch circuit, removing the jumper on the "hot" side, and using a common neutral, for use with two 1500-watt appliances. Is the spacing and barrier suitable for 230 volts across the two "hot" terminals?—L.E.M.



A. A Hubbell, Cat. No. 5252, receptacle is listed by Underwriters' Laboratories under its Reexamination Service, with a rating of 15 amps and 125 volts.

It has a break-off feature for two-circuit installations. When the jumper is removed, we actually have two separate receptacles and the combination may be served by a single-phase, 3-wire, 115/230-volt branch circuit as shown on your diagram. I believe that insulation provided by the barrier is sufficient for the 230-volt potential between the live terminals. In so far as this point is concerned, the design appears to be similar to Cat. No. 5292 which permits one of the receptacles to operate at 125 volts and the other at 250 volts.

In so far as the 15-amp rating is concerned, a 15-amp receptacle is limited to use on a 15- or 20-amp circuit. Two 1500-watt appliances connected to a 3-wire, 230-volt, 20-amp circuit takes 13 amps. Such a circuit loading appears to be in order provided the provisions of

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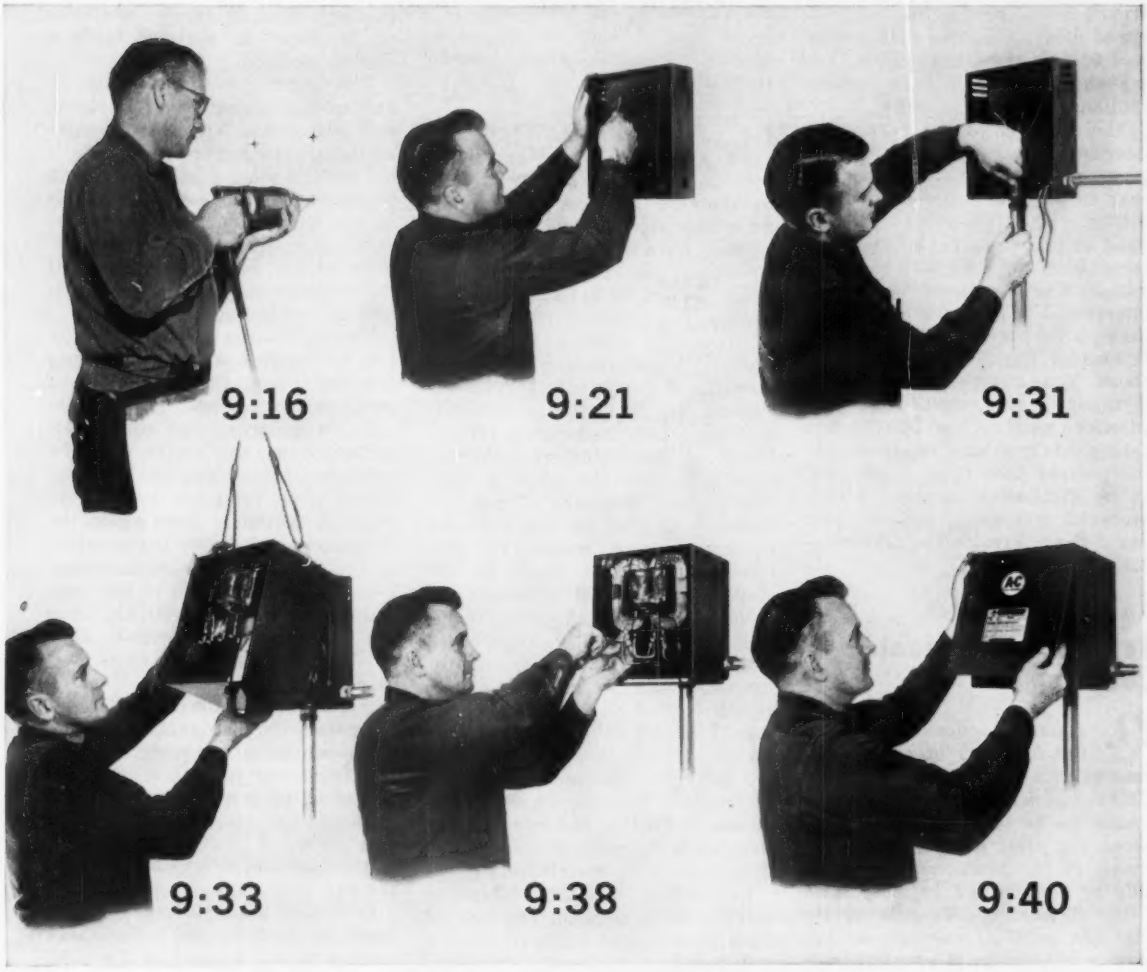
A-1360



9:16 — 16 minutes to drill 4 holes in concrete wall and add lead inserts to receive screws. **9:21** — 5 minutes to mount back panel to wall. **9:31** — 10 minutes to punch out knockouts and attach conduit. **9:33** — 2 minutes to put center case section in place and tighten side screws. **9:38** — 5 minutes to pull cables and connect to terminals. **9:40** — 2 minutes to fasten front panel to center section with side screws. **Installing time: 40 minutes instead of the usual hour and a half!**

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Section 210-24 (a) which read as follows are satisfied:

"15- and 20-Amp Branch Circuits. Lighting units and/or appliances. The rating of any one portable appliance shall not exceed 80% of the branch-circuit rating. The total rating of fixed appliances shall not exceed 50% of the branch-circuit rating when lighting units or portable appliances are also supplied."

The question you have raised is interesting since the status of such types of receptacles does not appear to be clearly covered by UL listing. The 125-volt limitation could be interpreted to preclude the recognition of the 230-volt terminals. The 15-amp rating could be interpreted to limit the load served through the receptacle to 15 amps. instead of the 26 amps described above. Your question indicates that it would be very helpful if such questions were covered by UL when listing this type of a receptacle. At the present time there appears to be no distinction between a conventional receptacle, and one that has the break-off feature.—B.A.McD.—9/60/6

Service Disconnect Location

Q. *I have a question concerning locations of the service disconnecting means. Section 230-70(b) requires the disconnecting means to be located at a readily accessible point nearest to the entrance of the conductors either inside or outside the building wall. Other sections of the code clarify that the point of entrance of the service conductors is usually somewhere within the building or outside on the building wall. From this, I would infer that the disconnecting means could not be located on a pole outside of the building. Your letter of April 18, 1959, supports this view, as does an interpretation I have received from our local state inspector. However, Section 230-106(b) (1) states that the requirements for overcurrent protection and disconnecting means may be fulfilled by an approved switch used with suitable fuses on a pole outside the building. Does this mean that only the fuses may be located on the pole outside the building, or may the switch serving as the disconnecting means also be located on the pole outside the building? Also, if it is permissible for the service disconnecting means to be located on a pole outside the building, how far away from the building may the pole be located? I realize the code requires the disconnecting means to be readily accessible, but nowhere can I find a limitation on the distance one must travel to reach the switch in order that it may be classed as readily accessible. Please clarify these points if possible.—D.J.N.*

A. The provisions of Section 230-70(b) are general in nature since the code does not attempt to visualize and provide for the many variables which may be involved. As a result, the authority enforcing the code, as outlined under Section 90-7, has the responsibility for interpreting the rules in line with existing field conditions. A literal reading of the rule indicates to me that the service disconnect may be located at a readily accessible point nearest to the entrance of the conductors, either inside or outside the building wall. The phrase "entrance of the conductors" implies entrance at the building. As a result, the disconnecting means could be installed on the outside wall of the building or, as usual, on the inside wall of the building. This rule, which covers services 600 volts or less, does not recognize a service switch located on a pole as in the case of Section 230-106 (b) 1 and 2, which pertains to services exceeding 600 volts. The omission of any reference to "location on a pole" indicates to me that the intent of the rule when formulated did not anticipate such an installation.

Regardless of the foregoing opinion, it is common practice on farm installations to locate service and metering equipment on poles. The poles are located near the center of the load, and the service disconnecting means, so located, may be several hundred feet from some of the buildings served. Under such circumstances, Section 230-76 applies and supplementary switches are installed in the buildings served. Such an installation gives the farmer protection and control over his overhead conductors, which could be very important, if such conductors fall to the ground during ice and wind storms. Service disconnecting switches, so located, are considered by many inspection authorities to be "readily accessible." They contend that such switches may be reached more quickly than some of our indoor service installations.

The code definition of "readily accessible" does not cover the question in terms of distance. It reads as follows:

"Capable of being reached quickly, for operation, renewal, or inspections, without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders, chairs, etc."

The nature of the wording indicates that questions of elevation and obstruction are prime considerations. The factor of distance is not covered since I believe it would be impractical to establish a rule in feet which would require "those to whom ready access is requisite" to be within a specified distance of the disconnecting means so that it may be reached quickly.

The provisions of Section 230-106(b) concern services exceeding 600 volts, and the provisions of paragraphs (1) and (2) specifically recognize service equipment, including fuse and switch, to be located on a pole outside the building. There is no reference to distance from the building. Here again the inspector must decide the question in line with existing circumstances. I do not believe there is any conflict with Section 230-70(b), since the provisions of Section 230-106(b) are a modification as covered by Section 230-100.

In other words, the code definitely recognizes the disconnecting means and overcurrent protection for a service exceeding 600 volts to be located on an outside pole. In some instances this may be a very desirable method of procedure regardless of the fact that it may be 25 or 50 ft away from the building.

In connection with my letter of April 18, 1959, we had a fused disconnect switch located on the pole, connected in the 120/208-volt secondary serving the building. The transformers also located on the pole were served by a 480-volt primary. As a result the provisions of Section 230-70(b) covering services, 600 volts or less, applied and my comment was based on this rule. If the code intends to recognize a service switch on a pole, as above described on farm installations, it appears that a code revision is in order.—B.A.McD.—9/60/7

Electric Range Installation

Q. *In the remodeling of a kitchen, the location of the electric range will be changed and in so changing, the range feeder,*

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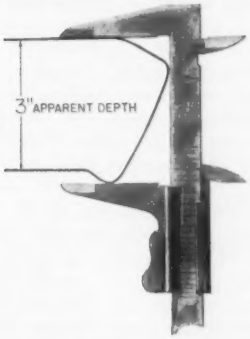

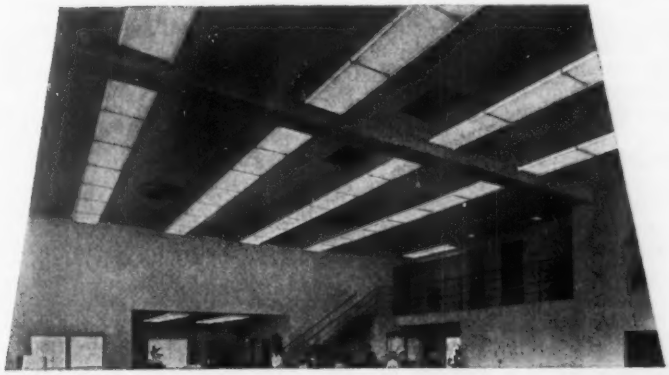

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which is 3-wire No. 8 service cable with uninsulated neutral, will not be of sufficient length to make connection to the range in its new location.

Can the cable be spliced and if so, how?—W.B.R.

A. Yes. The cable may be spliced by using a junction box of adequate size with a cover, and using approved connectors or bushings where the cable enters and leaves such junction box with the connections being spliced in an approved manner, either using pressure connectors or other approved means with joints insulated as is required by Section 110-14. Reference is also made to Table 370-6(a) and Section 370-7. Also, according to Section 370-19, JB's must be accessible.—R.E.W.—9/60/8

Wireway Application

Q. *We have a design project of upgrading a distribution system in two interconnected office buildings for the Air Force. This involves provision of transformers, feeders, panels, etc. It also includes reconnecting existing branch circuits from the old panels to the new.*

Owing to the nature of the building, maintaining flexibility, and economy it appears most feasible to use wireway for extending the branch circuits from the existing panels to the new, using the old panels to the new ones, using the old panels for junction boxes.

The question arises in the application of the wireway. According to Section 362-5 we are limited to 30 conductors and 20% of the cross-section area for fill. In some cases more than 30 conductors are required, and it just doesn't seem reasonable to run two wireways when a larger one could be selected. We are limiting the fill to 15% and derating the conductors in the wireway in all cases.

In discussing this question with the electrical engineer at the Air Defense Command Headquarters here, who is the technical reviewing authority for the Air Force before the plans go out for bids, we could not understand the philosophy on the limitation on the number of conductors. I wonder if you would clarify this point for us?—C.K.K.

A. As you say, the provisions of Section 362-5 limit the number of conductors in a wireway to 30, and the cross-sectional area of all contained conductors cannot exceed 20% of the interior cross-sectional area of the wireway. The correction factors in Note 8 of Tables 310-12 and 310-14 are not applicable to wireways.

This rule first appeared in the 1931 edition of the code, 29 years ago. At that time more than 30 conductors could be installed in a wireway by special permission. This permission was deleted in the 1937 edition of the code. Back in 1931, wireways were restricted to use in exposed dry locations in industrial occupancies. The principal occasion for such a wiring method was influenced by a desire to obtain a flexible wiring system so that circuits could be changed to meet changing conditions. An example is an industrial occupancy where machine tools are frequently moved or replaced for adaption to a specific job. Over the years the industrial occupancy restriction and other restrictions have been deleted, and according to the 1959 NEC are limited to exposed work where not subject to severe physical damage or corrosive vapor. They are not permitted in any hazardous location, but they are now recognized for outdoor installations when approved raintight construction is used.

The philosophy which influences the 30-conductor limitation is, to a considerable extent, expressed under Section 90-9 (b) which appears under the introduction to the code. It reads as follows:

"It is elsewhere provided in the code that the number of wires and circuits confined in a single enclosure be varyingly restricted. It is strongly recommended that electrical engineers and others who are planning installations provide similar restrictions wherever practicable, to the end that the effects of breakdowns from short circuits or grounds, even though resulting fire and similar damage are confined to wires, their insulation and enclosures, may not involve entire services to premises nor interruptions of essential and independent services."

While this philosophy still prevails, it is significant to note that the 1959 Code recognizes any number of conductors in a raceway (except wireways) when specified current derating factors are applied. See Table 1, Chapter 9. Previous to the 1959 Code, the number of conductors in a conduit or tubing was limited to nine, outside of a few exceptions. To determine if more than nine conductors could safely be installed in a raceway, and what derating factors should apply, the American Iron and Steel Institute sponsored a fact-finding investigation by the Underwriters' Laboratories, Inc. After more than two years of intensive investigation and study, the fact-finding report formed the basis for the new Table 1 with derating factors covered under Tables 310-12 through 310-15, Note 8. The report also recommended that a 40% fill be made to apply to all raceways including wireways; and that all restrictions with respect to the number of conductors in a raceway be eliminated, including wireways.

These recommendations were accepted for all raceways, with the exception of wireways and auxiliary gutters.

In view of the foregoing, the 1959 Code does not recognize more than 30 conductors in a wireway and the fill cannot exceed 20%. It is quite possible that a wireway could be used to considerable advantage on many applications on the basis of a 20% fill, and a 30 conductor limitation. Compared with conduit, the range of sizes is small, and on some installations a fill less than 20% would prevail. Such a factor of adequacy provides for future loads, and should be considered accordingly. It is possible that a future code will recognize the situation which prevails when a raceway is not filled to a 40% capacity. The question has already arisen with respect to conduit. Should the code recognize a 20% conduit fill with no derating factors when not more than 30 conductors are used? Is the condition any different than that which prevails with a wireway? Such questions have been recognized by the Technical Subcommittee supervising the UL Fact-Finding Report. The following statement appears in NFPA No. 70 PR-1958:

"The Technical Subcommittee calls attention to the fact that the derating factors recommended in this report are based on installations in excess of nine conductors and on raceway loading of 40% fill, whereas, especially in raceways where graded sizes of cross section are not available, it is quite common to find three and four wires in a raceway occupying much less than 40% fill. This presents a question as to whether special derating factors should be considered under these conditions. The Subcommittee recognizes that there would be many practical problems in the application of any such special factors."—B.A.McD.—9/60/9

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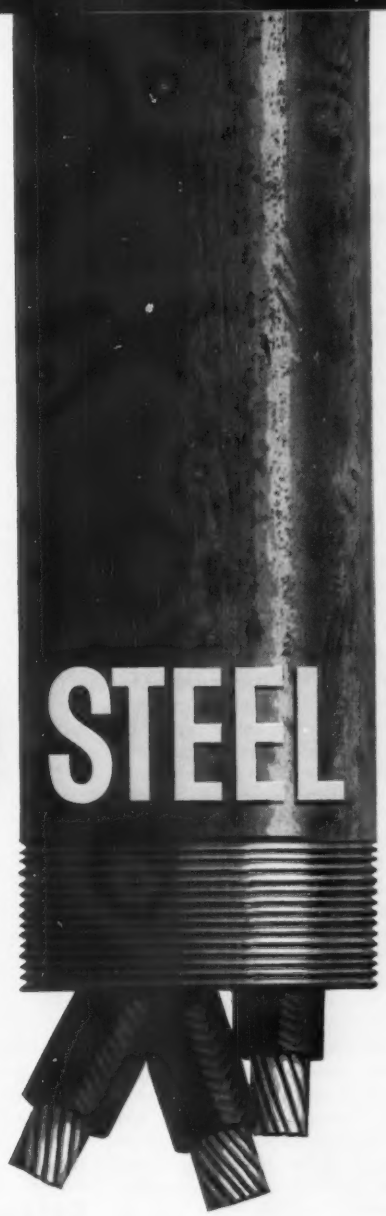

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Grounding Type Receptacles

Q. *I was going through a new church building which is being constructed in our community, and I noticed that none of the receptacles are of the grounding type, including some weatherproof receptacles on the outside of the building.*

I am wondering if Article 2545 *of the* 1956 *Code and* 250-45 *of the* 1959 *Code would not require them to be used. I mention the* 1956 *Code because the building was contracted for and construction started in* 1958. *All of the floors are masonry construction.—C.R.A.*

A. The provisions of Section 2545 (250-45) cover the grounding of the exposed non-current-carrying metal parts of portable equipment. The 1959 edition of the code makes a distinction, between a residential and any other type of occupancy, with respect to the various types of appliances and tools which are required to be grounded. The provisions of Section 250-45 (c) in the 1959 Code are entirely new, and apply only to residential occupancies. This is the first time that the code has recognized the hazard presented by ungrounded portable appliances in a residential occupancy, operating at a voltage of 150 volts or less. This new rule is quoted as follows:

"In residential occupancies, (1) clothes-washing, clothes-drying, and dishwashing machines, and (2) portable hand-held, motor-operated tools and appliances of the following types: drills having a chuck capacity exceeding ¼ in., hedge clippers, lawn mowers, wet scrubbers, sanders and saws."

While this new rule is not concerned with your code question, it is mentioned in view of its significance. A church occupancy is covered by Section 250-45 (d). This rule is the same as it appeared in the 1956 Code with minor editorial revisions. This rule is quoted as follows with editorial deletions as shown by the brackets:

"In other than residential occupancies, (1) [exposed metal parts of] portable appliances used in damp or wet locations, or by persons standing on the ground or on metal floors or working inside of metal tanks or boilers, and (2) portable tools which are likely to be used in wet and conductive locations [and not protected by insulated handles and enclosures] shall be grounded except where supplied through an insulating transformer with ungrounded secondary of not over 50 volts."

The method of grounding portable equipment by the use of a grounding type of receptacle and plug is covered by Section 250-59. When weatherproof receptacles are installed on the exterior outside wall of a church occupancy, it appears to me that they must be of the grounding type according to the 1959 or 1956 editions of the code. Receptacles, so located, may readily be used to serve portable appliances or tools, used by persons standing on the ground. Lawn mowers, drills, sanders, saws, hedge clippers are some of the appliances which may be served through receptacles located outside of the building. If grounding-type receptacles are installed, the contractor and the owner are in a favorable position in the event of an accident. When conventional receptacles are installed such concerned parties are assuming a responsibility which may be difficult to justify in the event someone suffers personal injury due to electric shock.

If the masonry floors are in direct contact with earth, they are considered to be wet locations, as covered by Section 310-5 of the code. Under such circumstances the above concept of code rules also applies. If such floors are covered by a conductive tile, such as some asphalt base tiles, this factor should be checked.

It is also significant to note the fine print note following Section 250-45 which reads as follows:

"It is recommended that the frames of all portable motors which operate at more than 50 volts and less than 150 volts to ground be grounded, where this can be readily accomplished." — B.A.McD. —9/60/10

Galvanized Water Pipe As Conduit

Q. *Does the code anywhere prohibit use of galvanized water pipe and fittings for raceways for electrical wiring?—G.F.*

A. It would be impracticable for the code to list all of the various materials which are not considered as suitable for wiring methods. Chapter 3 of the code recognizes the wiring methods and materials which are considered to be safe within the degree of safeguard established by the code. One of these wiring methods is rigid metal conduit. According to Webster a conduit is (1) a pipe or channel for conveying fluids, (2) a tube or protected trough for electric wires. According to Section 110-8 of the code: "Only wiring methods recognized as suitable are included in this code. The recognized method of wiring may be installed in any type of building or occupancy except as otherwise provided in this code." Section 110-2 advises that "the conductors and equipment required or permitted by this code shall be acceptable only when approved." Section 346-13 (b) has the following provision: "Steel conduit shall have an interior coating of a character and appearance so as to readily distinguish it from ordinary pipe commonly used for other than electrical purposes."

About 20 years ago, Official Interpretation No. 150 covered the question as follows:

"Question 2. May galvanized pipe be used as a means for mechanical protection for underground conductors that run up a pole?

"Finding: Pulling wires into iron pipe that is not conduit is not recognized in the code as a method for securing protection to contained conductors."

While the code does not specifically state that galvanized water pipe shall not be used as a raceway, it appears obvious from the foregoing that such use is not recognized. The same reasoning applies to nipples and fittings. In addition to the foregoing, there are several very good reasons why galvanized water pipe and fittings are not suitable as a raceway for conductors—B.A.McD.—9/60/11

Outdoor Sign Wiring

Q. *Can conductors with TW or RW insulation be used in outdoor sign wiring above ground when in flexible metal conduit such as would be used running from sign switch to sign outlets?—B.W.*

A. Yes. Section 350-2 of Article 350 states in part:

"Flexible metal conduit shall not be used in wet locations, unless conductors are of the lead-covered type or of other type specially approved for the conditions."

RW and TW are both approved for use in wet locations. Therefore, the answer is yes as far as the code is concerned although some inspectors object to the use of flexible metal conduit in outside locations.—R.E.W.—9/60/12

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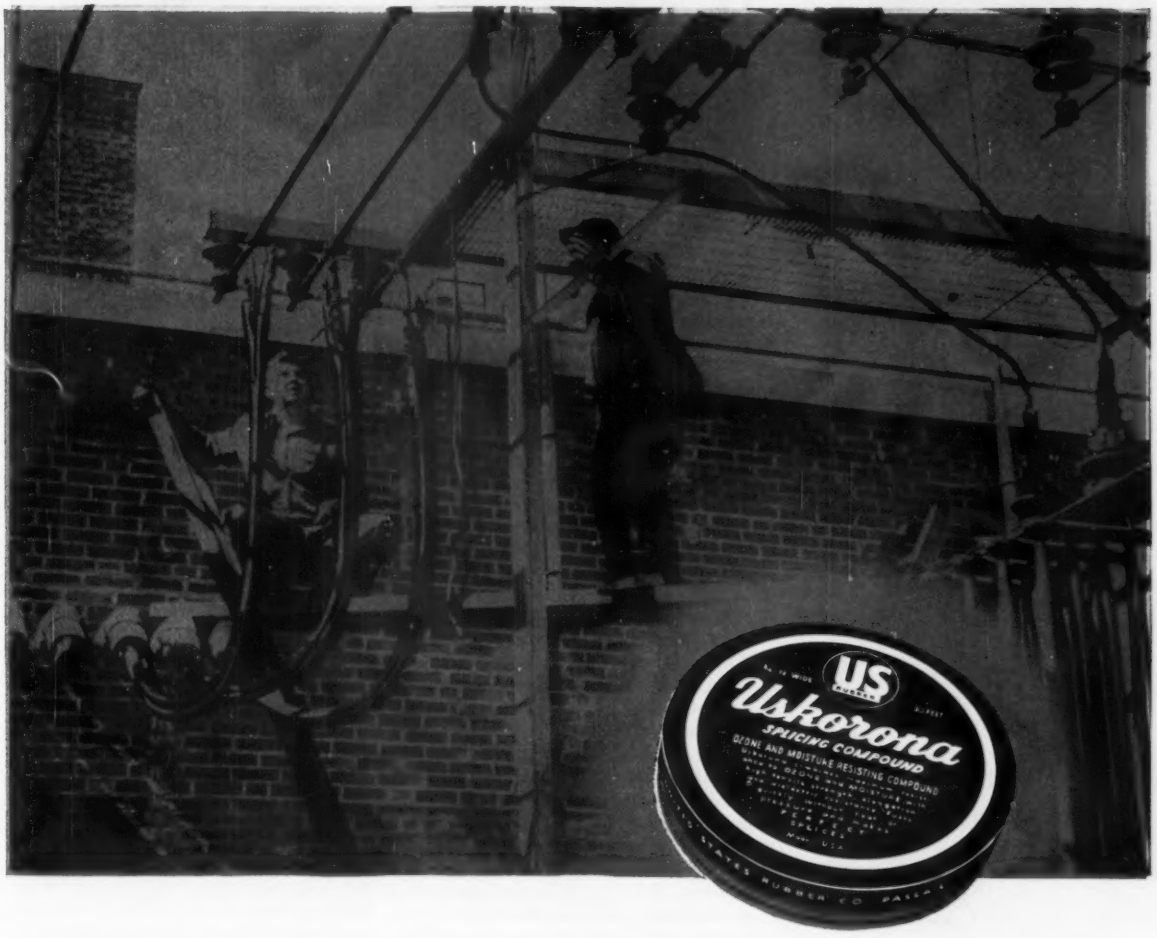

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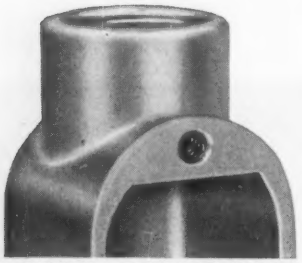

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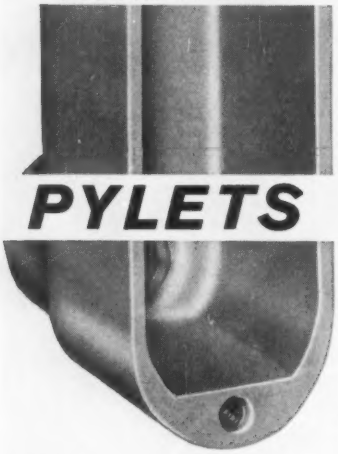

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Outlets in Wet Locations

Q. *We have had considerable differences of opinion over what is and is not a wet location. Would you please answer the following specific questions:*

a. Is the interior space of an exterior concrete masonry wall a wet location? What if the wall is painted on the outside with latex paint?

b. If an outlet box serving an outside light is embedded in an exterior concrete masonry wall, may the box be sheet metal or must it be cast? Does the same hold true if the wall is concrete?

c. Does the phrase "exposed to the weather" include such outside locations as under a small canopy or open porch? (See definition of "wet location.")

I have always required cast boxes on exterior work, whether surface or embedded. Please clarify whether this is the instent of the code in your opinion.—D.J.N.

A. A wet location is defined by the NEC as follows:

"A location subject to saturation with water or other liquids, such as locations exposed to weather, washrooms in garages, and like locations. Installations underground or in concrete slabs or masonry in direct contact with the earth shall be considered as wet locations."

In reply to question (a), it appears obvious that the interior space of an exterior concrete masonry wall is not a wet location, regardless of protection with latex paint. Such an area is not exposed to saturation with water, such as occurs in washrooms of garages, nor is it directly exposed to the weather. It is protected from the weather by its exterior surface. The phrase "exposed to the weather" is intriguing since the definition of weather covers the state of the atmosphere with respect to cold, heat, rainfall, drought, storms, fog, hail, snow, etc. There are some areas in the United States where rainfall is either nothing or very small, while other areas have a heavy monthly rainfall. The use of the word "weather" makes no distinction between the type of weather involved. I believe we all understand the intent, but it appears to me that the definition should cover the intent more clearly. I do believe, however, that the interior space of a concrete masonry wall below grade in direct contact with the earth would be considered a wet location. This observation is based on a literal reading of the rule, without any consideration of the extremely dry areas which prevail in some areas of our country. It would be very difficult, if not impractical, for the code to cover the various climatic conditions which exist in our country. It appears to me that the code, through the definition of "approved," gives the inspector considerable latitude to decide the correct procedure in line with existing circumstances.

Question (b). The provisions of Section 370-6 read as follows:

"In damp or wet locations, boxes and fittings shall be so placed or equipped as to prevent moisture or water from entering and accumulating within the box or fitting. Boxes and fittings installed in wet locations shall be weatherproof."

It is significant to note that this rule makes a distinction between an outlet box installed in a damp location and one installed in a wet location. An outlet box installed in a damp location is not specifically required to be weatherproof as is required for wet locations. "Weatherproof" is defined as follows: "So constructed or protected that exposure to the weather will not interfere with its successful operation." Raintight is defined as follows: "So constructed or protected that exposure to a beating rain will not result in the entrance of water."

In the case under discussion we have an outlet box, embedded in an exterior concrete wall covered by a lighting fixture. The box itself is not directly exposed to the weather or a beating rain, but the fixture is so exposed. As a result, the fixture is required to be raintight, and the box is only required to satisfy the provisions of Section 370-6 quoted above. Reference to UL 57, electric lighting fixtures, indicates that a fixture intended for outdoor use or for use in other wet locations will be marked to indicate such use. A summary of the foregoing rules indicates to me that a sheet-metal box could be used insofar as code rules are involved. A typical example is the small floodlight fixtures approved by UL which are used for outside lighting on residential and farm properties. Such fixtures are designed to be attached to conventional outlet boxes recessed in the wall of the building.

Question (c). I do not believe that a recessed box under a small canopy, or an open porch, is considered to be in a wet location.—B.A.McD.—9/60/13

Grounded Conductor

Q. *Can service-entrance cable with a covered neutral (uninsulated) be used in interior wiring as a feeder from the service entrance equipment to a 115-volt distribution panel in a residence with the two insulated conductors being used as current-carrying conductors and the covered or uninsulated wire being used as a grounding conductor only?—R.M.M.*

A. Yes. The answer to your question will be found in the fine-print note in Article 338:

Sec. 338-3. Use as Branch Circuit or Feeders.

"(a) Service-entrance cables may be used in interior wiring systems where all the circuit conductors of the cable are of the rubber-covered or thermoplastic type.

"(b) Service-entrance cables without individual insulation on the grounded conductor may be used only for range, wall-mounted oven and counter-mounted cooking unit, and clothes dryer circuits, or as feeders from a service cabinet to supply other buildings, or as service-entrance conductors for such other buildings, when the following conditions are met:

(1) The cable has a final nonmetallic outer covering.

(2) The supply is alternating current not exceeding 150 volts to ground."

Fine Print Note:

"The above provisions do not intend to deny the use of service entrance cable for interior use when the fully insulated conductors are used for circuit wiring and the uninsulated conductor is used for equipment grounding purposes."

The above note has been inserted as a result of Official Interpretation No. 419 which read:

"Under the intent of Section 3382 may approved 3-conductor service-entrance cable, having two insulated conductors and one conductor without individual insulation, be used for 2-wire branch circuits when the uninsulated conductor is intended solely for grounding purposes? Answer: Yes."

In all probability your neutral or grounded conductor will require identification and in a case of this kind inspectors usually will allow the identification to be done by using paint on the neutral as is outlined under Section 200-6. Means of Identification of Grounded Conductors.—R.E.W.—9/60/14

Conductors in Multiple

Q. *Section 310-10 of the NEC states that conductors of 1/0 and larger may be run in multiple, etc.*

Please give me the reason or reasons why conductors smaller than 1/0 cannot be run in multiple.

I have had many inquiries on that section and would appreciate an explanation.—P.B.

A. For the convenience of our readers the provisions of Section 310-10 are quoted as follows:

"Conductors in sizes 1/0 and larger may be run in multiple provided they are of the same length and have the same circular-mil area and type of insulation. When conductors are run in multiple, they shall be arranged at both ends in such a manner as to assure equal division of the total current between all conductors that are involved."

Back in 1930 the rule read as follows: "Conductors may be placed in multiple only by permission of the authority enforcing the Code." During the past 30 years the rule has been revised on several occasions.

Speaking in general, conductors run in multiple present a hazard when the above qualifications are not satisfied. When the parallel conductors are not of the same length, and the resistances of terminal connections are unequal, we may expect to find unequal resistances over the parallel path. Since the current over each conductor is inversely proportional to its resistance, the conductor having the lower resistance will "hog the load," become overloaded, and its maximum operating temperature may be exceeded. In addition to the hazard involved, such a condition could promote excessive voltage drop.

If the code did not recognize conductors 1/0 or larger to be run in multiple, it would be impracticable to install larger services and feeders, 700 amps and upward, with insulated conductors. Outside of the provisions of Section 620-12(a) covering traveling cables for lighting circuits on elevators, I do not believe that the code recognizes the use of conductors smaller than 1/0 to be run in multiple. The code does not generally recognize such use since there appears to be no occasion to do so, and it might be more difficult to obtain equal resistances over the parallel paths.—B.A.McD.—9/60/15

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[FROM PAGE 107]

job was entitled to a lower overhead than the hospital project.

Jones' revised estimate for the industrial project is shown in Fig. 5. Note that he now used overhead markups of 7% on material and 25% on labor instead of the 8% and 30% figures applied to his original estimates for both the hospital and industrial bids. His revised estimated "sell price" for the industrial job was within $54 of the low bidder's estimated sell price. To meet the low bid, Jones' actual sell price was less than 1% under his revised estimate.

FIG. 2—LOW BIDDER'S HOSPITAL ESTIMATE

Material—purchase price		$10,500
Labor—payroll		10,800
Total base cost		$21,300
Direct job expense	3%	639
Total direct job cost		$21,939
Overhead	15%	3,291
Complete installation cost		$25,230
Profit	10%	2,523
Estimated sell price		$27,753

Bid Price $27,750

FIG. 3—JONES' ORIGINAL INDUSTRIAL PROJECT ESTIMATE

		MATERIAL		LABOR
Base costs (material purchase)		$12,600	Payroll	$8,000
Direct job expense (material)	2%	252		
Direct job expense (labor)	6%	480		
		$13,332		$8,000
Overhead	8%	1,067	30%	2,400
Complete job costs		$14,399		$10,400
Return	5%	720	10%	1,040
Sell price—Material		$15,119		$11,440
Sell price—Labor		11,440		
Estimated sell price—The Job		$26,559		

Bid Price $26,600

FIG. 4—LOW BIDDER'S INDUSTRIAL PROJECT ESTIMATE

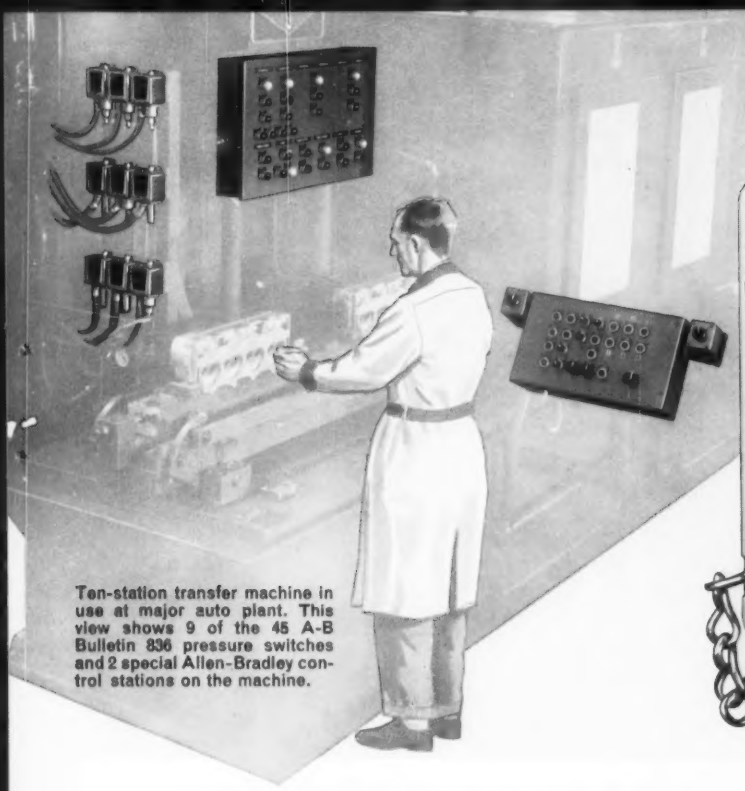
Material—purchase price		$12,600
Labor—payroll		8,000
Total base cost		$20,600
Direct job expenses	4%	824
Total direct job cost		$21,424
Overhead	10%	2,142
Complete installation cost		$23,566
Profit	10%	2,357
Estimated sell price		$25,923

Bid Price $25,750

FIG. 5—JONES' REVISED INDUSTRIAL PROJECT ESTIMATE

		MATERIAL		LABOR
Base costs (material purchase)		$12,600	Payroll	$8,000
Direct job expense (material)	2%	252		
Direct job expense (labor)	6%	480		
		$13,332		$8,000
Overhead	7%	932	25%	2,000
Complete job costs		$14,264		$10,000
Return	5%	713	10%	1,000
Sell price—Material		$14,977		$11,000
Sell price—Labor		11,000		
Estimated sell price—The Job		$25,977		

Actual Price to Meet Low Bid—$25,750



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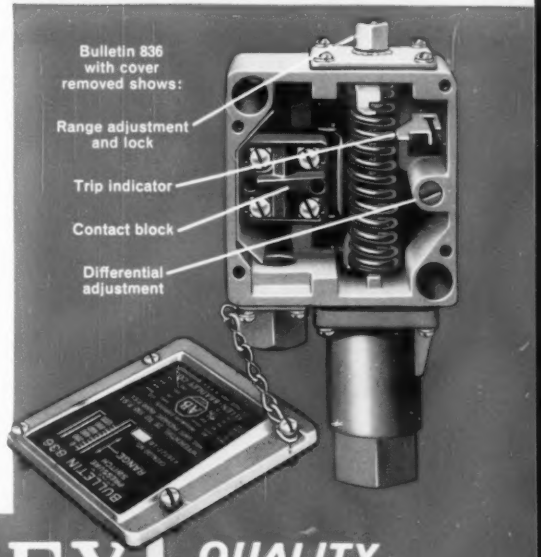

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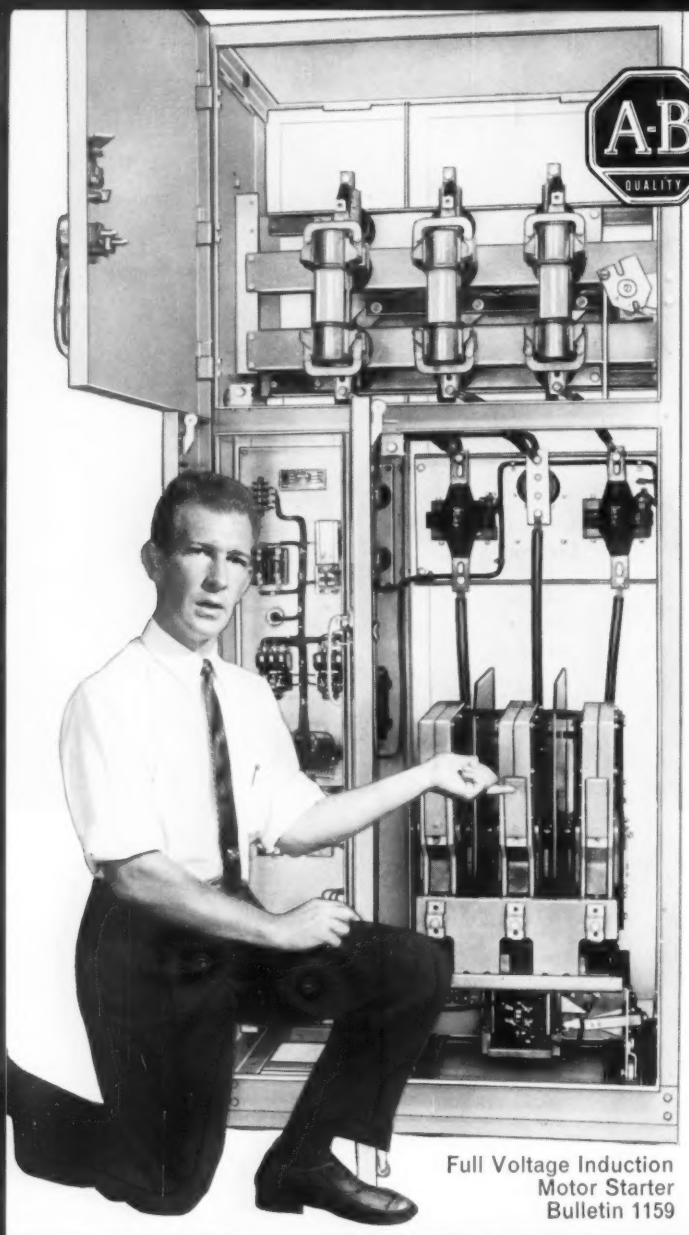

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Bulletin 1159

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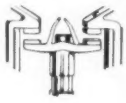
built to provide millions of trouble free operations

An astounding claim but true! The secret of this remarkable operating life of Allen-Bradley high voltage air break starters is found in the extremely short contact travel—*it's only 3/8"*. Thus, pounding and contact wear are reduced to a minimum. In addition, contactors in A-B high voltage starters have only ONE moving part. It's the same simple solenoid design that has proved good for millions of trouble free operations in A-B low voltage starters. And like A-B low voltage starters, the double break, silver alloy contacts never need maintenance. For complete details on Allen-Bradley high voltage starters, send for Publication 6080.

FEATURES OF THE ALLEN-BRADLEY RUGGED SOLENOID AIR BREAK CONTACTOR

ONE MOVING PART
All trouble-causing pivots, pins, and flexible jumpers are eliminated.

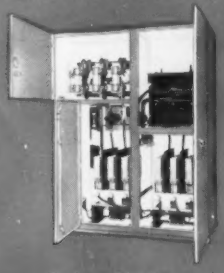
CONTACT TRAVEL ONLY 3/8"
Reduced impact and pounding extends contact operating life.



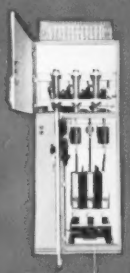
DOUBLE BREAK CONTACTS
of silver alloy completely eliminate the need for contact maintenance.

FAST ARC SUPPRESSION
New blowout design, new arc chutes molded of arc resistant material.

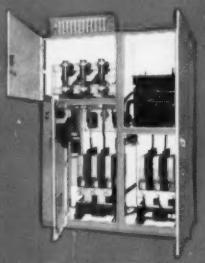
ALLEN-BRADLEY HIGH VOLTAGE STARTERS ARE MADE FOR ALL TYPES OF MOTORS AND ALL TYPES OF SERVICE



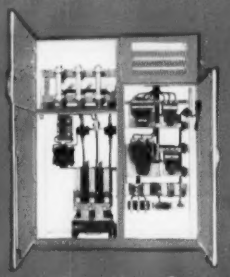
Reduced Voltage
Induction Motor Starter
Bulletin 1172



Full Voltage
Synchronous Motor Starter
Bulletin 966



Reduced Voltage
Synchronous Motor Starter
Bulletin 983



Wound Rotor Motor Starter
Bulletin 1180

ALLEN-BRADLEY

Member of NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ontario

QUALITY MOTOR CONTROL

12-60-MR

How You Can Help to Improve The NEC

Do you have a pet code subject? Maybe you feel an existing code rule is too weak or too strict. Or perhaps the code doesn't cover your idea at all. Here's how you —as an individual—can do something about it.

TOO many members of the electrical industry don't realize that individuals can submit their proposals for changes to the NEC. And these proposals will be given the same consideration as those submitted by the many organized electrical groups who have so capably contributed to the betterment of the code.

However, according to the latest code timetable, proposals by individuals must be submitted on or before December 1, 1960 to be considered for adoption in the 1962 edition of the NEC. Therefore, the time to act is now.

Included in this article is an up-to-date list of the names and addresses of the code panel chairmen, and the president and secretary of the Electrical Section of the NFPA. In addition, a flow chart indicates how a proposal is handled through the various panels and committees to eventual adoption in the next code edition; that is, if a proposal is worthy.

Before writing down your code proposal, check it against the type that usually catches the eye of the NE Code-makers.

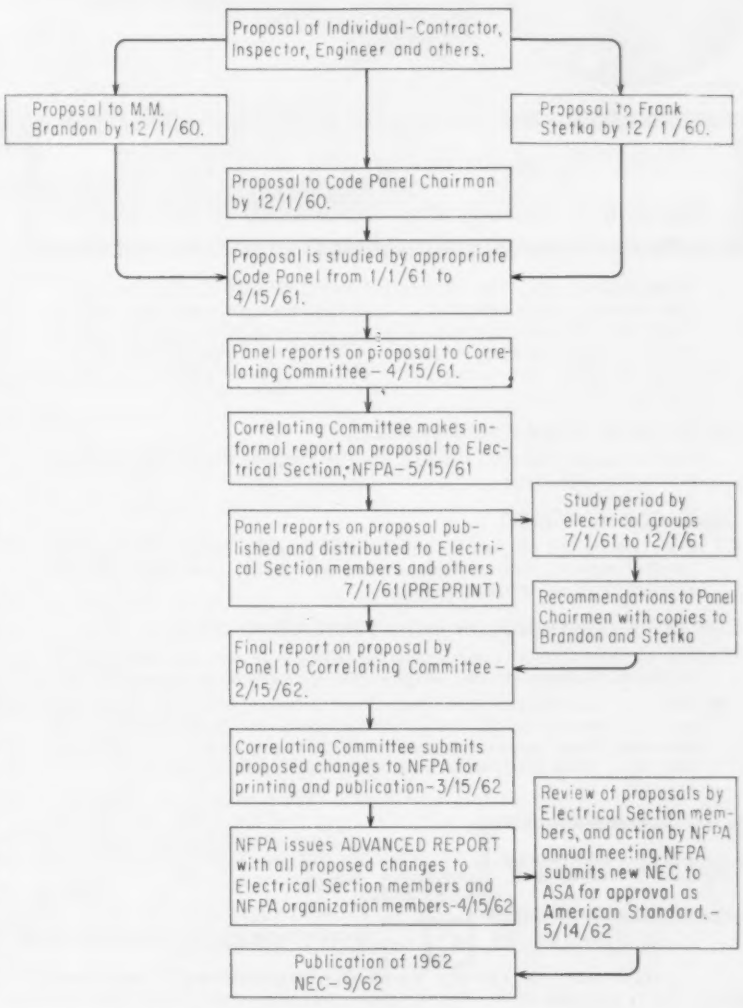
1. One should bear in mind that the NEC is a minimum safety standard, and all proposals should be predicated on this assumption.

2. Each proposal should include the reason why a code change is necessary. This would include supporting evidence or documentary evidence to justify a change. Or it might be a case history of an electrical equipment failure which has caused an injury or fire, and there is no present code rule covering the situation. All members of the NE Code-making panels serve voluntarily and without remuneration. We can help them immensely if, as individuals or associations, we follow these two major considerations in submitting proposals for code changes.

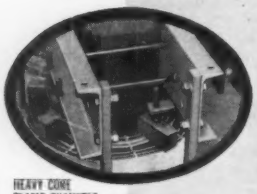
Now, if you have a code revision that measures up to these two points, the first step is to write it up and send it to:

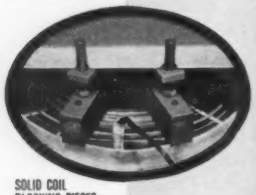
Merwin M. Brandon, Chairman,
NEC Correlating Committee
Underwriters' Laboratories, Inc.
207 East Ohio St., Chicago 11, Ill.

A copy of this letter should be sent to:

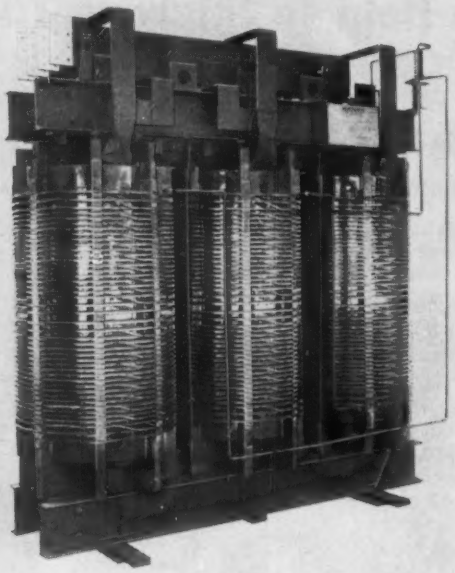

Proposal of Individual-Contractor, Inspector, Engineer and others.
Proposal to M.M. Brandon by 12/1/60.
Proposal to Frank Stetka by 12/1/60.
Proposal to Code Panel Chairman by 12/1/60.
Proposal is studied by appropriate Code Panel from 1/1/61 to 4/15/61.
Panel reports on proposal to Correlating Committee – 4/15/61.
Correlating Committee makes informal report on proposal to Electrical Section, NFPA – 5/15/61
Panel reports on proposal published and distributed to Electrical Section members and others 7/1/61 (PREPRINT)
Study period by electrical groups 7/1/61 to 12/1/61
Recommendations to Panel Chairmen with copies to Brandon and Stetka
Final report on proposal by Panel to Correlating Committee – 2/15/62.
Correlating Committee submits proposed changes to NFPA for printing and publication – 3/15/62
NFPA issues ADVANCED REPORT with all proposed changes to Electrical Section members and NFPA organization members – 4/15/62
Review of proposals by Electrical Section members, and action by NFPA annual meeting. NFPA submits new NEC to ASA for approval as American Standard. – 5/14/62
Publication of 1962 NEC – 9/62

TYPICAL OF HEVI-DUTY TRANSFORMERS


HEAVY CORE CLAMP CHANNELS


SOLID COIL BLOCKING PIECES

VENTILATION DUCTS



Designed for durability and compactness... maximum cooling with ventilated construction

What makes a good dry type transformer? Sturdy clamping construction assures ample damping of core vibration, and complete air-flow ventilation between core and coils provides years of trouble-free service under continuous operation. Hevi-Duty Dry Type Transformers—single and three-phase up to 3000 KVA—give you all this plus extremely low decibel ratings.

HEAVY CORE CLAMPING CHANNELS

Core is tightly clamped between steel weldments which help to maintain quiet operation.

SOLID COIL BLOCKING

Coils are rigidly blocked with individual pressure blocks to withstand internal stresses, and provide protection against load short circuits and lightning or switching surges.

STEP-CORE CONSTRUCTION WITH VENTILATING DUCTS

The air flow through cooling ducts between core and coil base assures minimum temperature rise in the center leg as well as on outside legs.

- Step-core construction and individual pressure blocking pieces are standard features on all Hevi-Duty transformers. You can be sure of obtaining these features by specifying "STEPPED CORE CONSTRUCTION REQUIRED, WITH INDIVIDUAL COIL PRESSURE BLOCKING PIECES."

For more information on Hevi-Duty Dry Type Transformer design features, write for Bulletins 100 and 200.

HEVI-DUTY

A DIVISION OF BPC BASIC PRODUCTS CORPORATION

HEVI-DUTY ELECTRIC COMPANY, MILWAUKEE 1, WISCONSIN

Industrial Furnaces and Ovens, Electric and Fuel • Laboratory Furnaces • Dry Type Transformers • Constant Current Regulators

JACK L. BLACKLEDGE has been named executive director of the Electrical League of New York Inc., succeeding Don E. Rosenthal, who has moved to California. Over a period of 36 years Blackledge has been employed in a number of industry positions including manufacturing, distribution and electrical construction. For the past year he has been managing a group of electrical supply houses in upstate New York.

Frank Stetka, Secretary,
NEC Correlating Committee
612 North Michigan Ave.
Chicago, Ill.

And while not required, it is a good idea to send a copy of the proposal to the chairman of the appropriate code-making panel. The panel chairmen, their addresses, and the code articles that come under their jurisdiction are as follows:

NE Code-Making Panel Chairmen

Panel on Introduction—Article 90. D. L. Johnson, 309 City Hall, Atlanta 3, Ga.

Panel No. 1—Articles 100-110. Kent Stiner, BullDog Electrical Products, Box 177, Detroit 22, Mich.

Panel No. 2—Articles 200, 210, 215, 220, 700. H. H. Watson, General Electric Co., 1285 Boston Ave., Bridgeport 2, Conn.

Panel No. 3—Articles 230, 600, 730. O. K. Coleman, Edison Electric Institute, P. O. Box 705, Lafayette, Ind.

Panel No. 4—Articles 240. R. L. Lloyd, National Bureau of Standards, Rm. 4042, Industrial Bldg., Washington 25, D. C.

Panel No. 5—Articles 250, 280. L. S. Inskip, Bell Telephone Lab-

REVOLUTIONARY NEW WAY TO CONNECT WIRES

1 STRIP WIRE

2 INSERT WIRE

Suddenly outmoded are tools, tape, twisting, and tucking of excess wire.

Wires cannot pull out of — nor work loose from — the handsome red thermoplastic Wiremold Wire Connector, which measures 1-5/16" x 1/2" x 5/16" and even has a strip gage molded into it.

No slack is needed for any T-splice, so Plugmold now becomes even easier to install and can save more time on every job.

Connects as many as four No. 14 or No. 12 conductors. UL listed, of course.

Included with every Plugmold wired section and every package of Snapicoil.

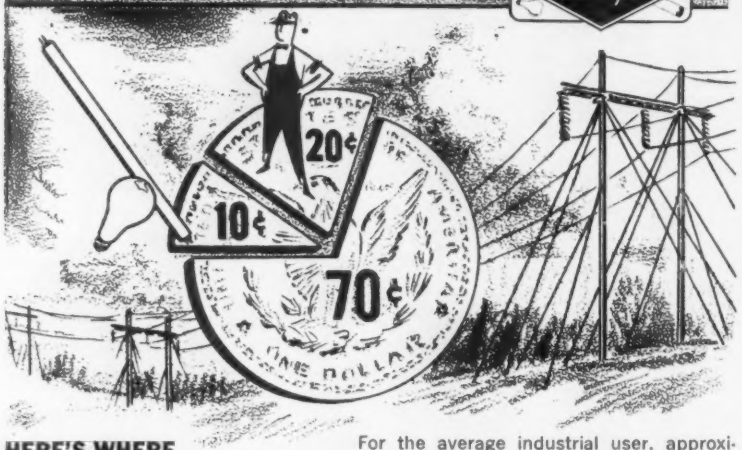
Wiremold Wire Connectors can be bought in cartons of 10 or 50. At Wiremold distributors. Now.

WIREMOLD®

DEPT. EO-9 • HARTFORD 10, CONNECTICUT

Facts of Light!

CHAMPION Lamps



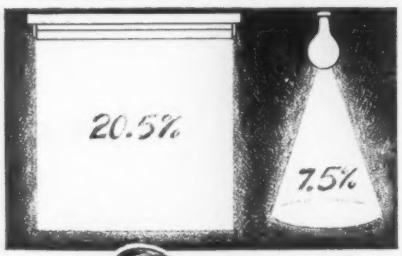
HERE'S WHERE THE MONEY GOES WHEN YOU BUY LIGHT

For the average industrial user, approximately 10 cents of every dollar spent for light goes for lamps; approximately 20 cents goes for maintenance labor; and about 70 cents goes for electric power.

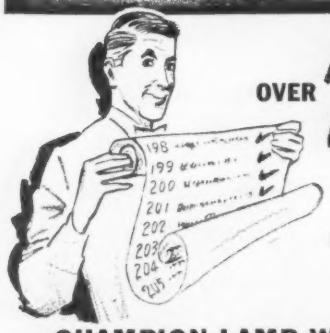
2 100's WON'T DO THE WORK OF 1 200

A 200 watt incandescent lamp produces approximately 3800 lumens. Two 100 watt incandescent lamps produce approximately 3400 lumens — about 10% less light.

WATT FOR WATT, FLUORESCENTS PRODUCE TWICE AS MUCH LIGHT AS INCANDESCENTS



About 7.5% of the electrical energy consumed by a typical 40 watt incandescent lamp is produced as light. In a typical 40 watt fluorescent lamp, the percentage is about 20.5. In both types, the remainder of the electrical energy is heat loss.

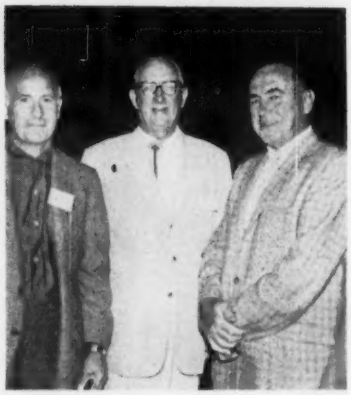


OVER 200 INSPECTIONS GUARD CHAMPION LAMP QUALITY

Checks and counter checks at each step of production guard the quality and uniformity of Champion lamps. Result: you get all the light you pay for when you use Champions.

CHAMPION LAMP WORKS, Lynn, Massachusetts

CHAMPION INCANDESCENT-FLUORESCENT • *YOUR BEST BUY IN LAMPS*



ATTENDING the meetings of the New York State Electrical Contractors and Dealers, Inc. at Whiteface Inn were Samuel Gold, Jandous Electric Construction Corp., New York; John Doris, John Doris, Inc., New York City; and C. A. Mulligan, Charles A. Mulligan, Inc., Central Islip, N. Y.

oratories, Inc., Murray Hill, N. J.

Panel No. 6—Articles 300, 310, 400. H. R. Stevenson, Detroit Edison Co., 2000 Second Blvd., Detroit 26, Mich.

Panel No. 7—Articles 320, 324, 328, 330, 334, 336, 338, 339, 342, 344, 390. Joseph Whitner, South-Eastern Underwriters Association, Box 5048, Atlanta, Ga.

Panel No. 8—Articles 346, 348, 350, 351, 352, 353, 354, 356, 358, 362, 364. W. R. Volheye, Bureau of Labor, 1216 S. W. Hall St., Portland 1, Oregon.

Panel No. 9—Articles 370, 373, 374, 380, 384. W. P. Hogan, Jr., Chief Electrical Inspector, City of Chicago, 321 N. La Salle St., 4th floor, Chicago 10, Ill.

Panel No. 10—Articles 402, 410, 422. Buford Martin, Electrical Development Branch of Tennessee Valley Authority, 417 Edney Bldg., Chattanooga, Tenn.

Panel No. 11—Articles 430, 445. Richard W. Osborn, Osborn Electric Company, 5516 S. Kingshighway, St. Louis 9, Mo.

Panel No. 12—Articles 610, 620, 630, 670. E. E. Carlton, California Div. of Industrial Safety, 965 Mission St., San Francisco 3, Calif.

Panel No. 13—Articles 450, 460, 470, 710. C. F. Hedlund, Factory Mutual Engineering Div., P. O. Box 510, Norwood, Mass.

Panel No. 14—Articles 480, 500-503, 510-517. F. J. Zeleny, Western Regional Office, Factory Insurance Association, 175 W. Jackson Blvd., Chicago 4, Illinois.

Panel No. 15—Articles 520, 530,

MYSTIK BRAND

a plastic electrical tape of SUPERIOR QUALITY!

MYSTIK BRAND Plastic Electrical Tape is made by the same company that introduced silicone adhesives—the company that created the hi-low temperature tapes used in the U. S. satellite and missile program. Here's a tape you *know* you can count on!

MYSTIK No. 6407 offers some important advantages you *ought to hear about.* It's easy to use—sticks quickly and conforms readily to irregular surfaces. Saves you taping time. No. 6407 offers high dielectric strength and laughs off oil, acids, alkalies, weather and wear. Seals tight as a drum—assures trouble-free performance on every job.

* * *

Call your electrical wholesaler today. Insist on Mystik Brand 6407 Plastic Electrical Tape—now packed in a handy, protective can. You'll always be glad you did!

MYSTIK ADHESIVE PRODUCTS, INC.

2635 N. KILDARE AVE. • CHICAGO 39

MYSTIK® BRAND SELF-STIK

There's a Royal "POWR-KORD" for every need:

- RUBBER or VINYL
- BLACK or RED (rubber)
- RED or YELLOW (vinyl)
- HANDY LENGTHS — from 10' to 100'
- IN THESE TYPES and SIZES:
  #18 and #16 SJ — 2- and 3-conductor
  #18 thru #12 S — 2-conductor
  #14 and #12 S — 3-conductor
  #18 and #16 SJT — 2-conductor

. . . the all-quality line of all-purpose heavy-duty extensions

Here's the kind of rugged construction that pays off on the job: MOLDED-ON caps and connectors, — built-in strain reliefs — Royal-quality cord — heavy brass blades and double-wipe contacts — locked-in-place molded construction . . . and FULLY UL LISTED!

Next time you're ordering electrical supplies from your wholesaler, be sure to include Royal "POWR-KORDS".

ROYAL ELECTRIC
. . . an associate of UL

ROYAL ELECTRIC CORPORATION
Pawtucket, Rhode Island
In Canada: Royal Electric Company (Quebec) Ltd.
Pointe-Claire, Quebec

WINNER of first prize in the commercial classification of the IES Applied Lighting Competition, New York Section, was Noel Florence (left), luminaire designer for Lightolier, Inc., New York City, receiving check and congratulations from Ray L. Smart, IES Vice President, Northeastern Region, and illuminating engineer, Boston Edison Co., Boston. The award was based on the lighting of the new Time and Life Building, at Sixth Avenue and 50th Street, New York City.

540, 640, 650, 810. K. S. Geiges, Underwriters' Laboratories, Inc., 1655 Scott Lane, Santa Clara, Calif.

Panel No. 16—Articles 720, 725, 800. F. T. Wright, Underwriters' Laboratories, Inc., 161 Sixth Ave., New York 13, N. Y.

Panel No. 17—Articles 660, 665. M. G. Folkes, Chief Electrical Inspector, 306 City Hall Annex, Richmond 19, Va.

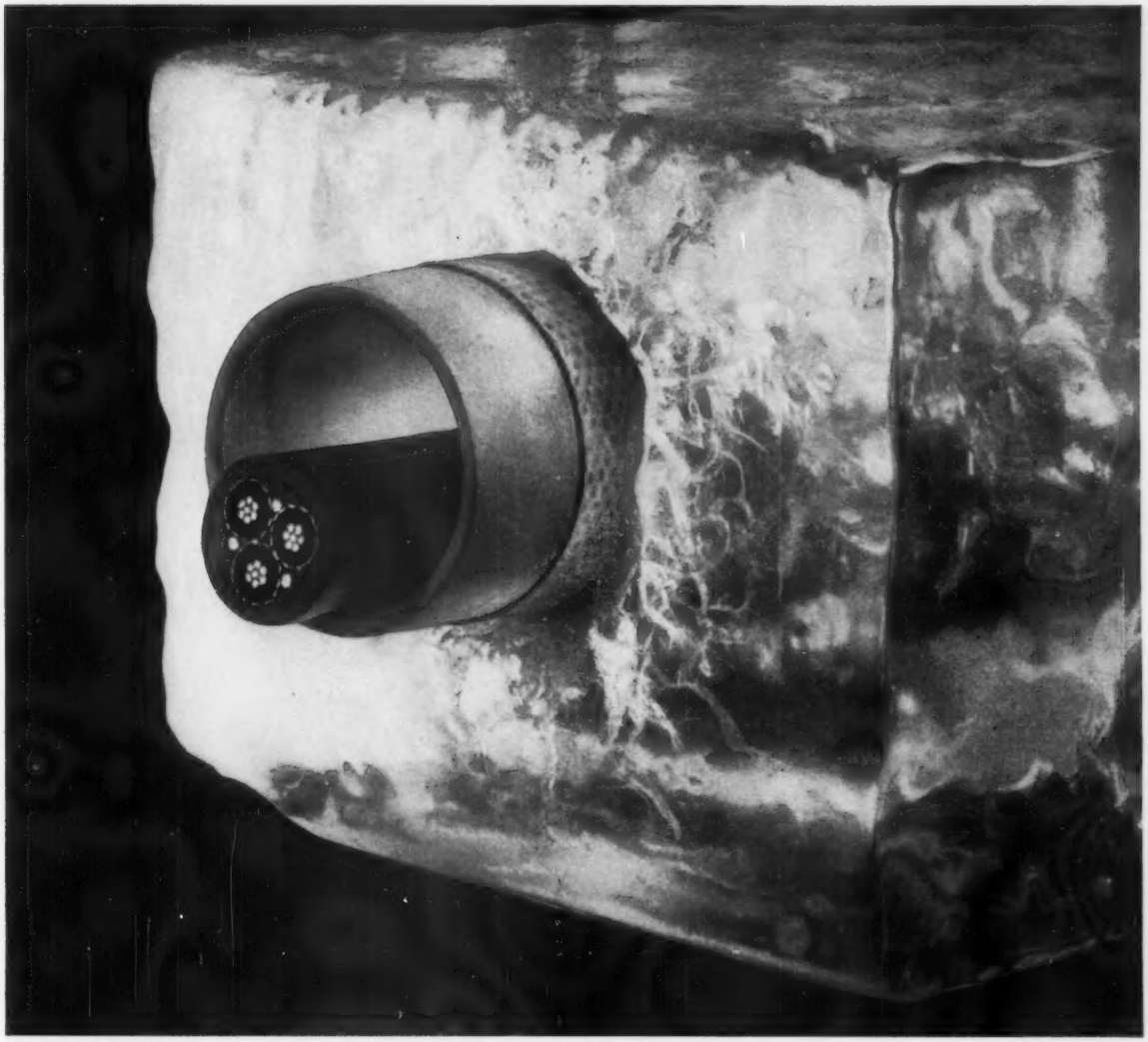
Any contribution you can make regarding improved code changes will result in a better-accepted, higher-regarded, up-to-date NEC. Increased interest shown in any standard can only bring about improvement and better understanding.

NYBFU Extends Effective Date of N-I Breakers

Carlton E. Schaad, State Superintendent of the New York Board of Fire Underwriters, Bureau of Electricity, has announced that the mandatory compliance of Section 240-25 (g), 1959 NEC, will be extended to January 1, 1961 in the State of New York.

While the effective date of compliance for non-interchangeable circuit breakers is stated as July 1, 1960 in the 1959 NEC, several problems relating to revised UL standards and manufacturing schedules have justified the extension.

The NYBFU thought that the date of January 1, 1961 would be

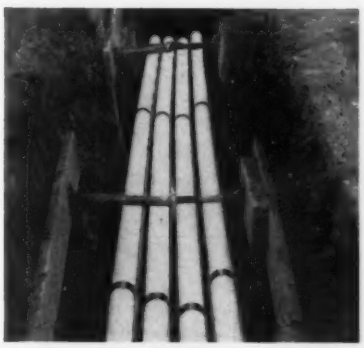


Cooler cables at lowest costs with Transite Ducts!

Do you know that electrical system losses amount to more than four hundred million dollars annually? Research shows that these losses can be drastically reduced by improving the dissipation of heat from conductors under load. The most efficient and economical way to accomplish this is with inorganic Transite® Ducts.

Tests prove that asbestos-cement Transite Ducts can actually have as much as 110.6% greater heat-carrying ability than organic ducts. This means that when a conductor is supplying a given load, its temperature will be substantially lower in Transite. These cooler cables result in lower electrical resistance with correspondingly lower I^2R losses. At a $20/KW cost, this can save you as much as $8.20 per thousand feet a year. Lower operating temperatures mean longer cable life and more reliable service, too!

Because of their 10′ lengths and speedy coupling method, Transite Ducts can be installed at the lowest cost. Get the full story by writing Johns-Manville, Box 14, ECM-9, New York 16, N. Y. In Canada: Port Credit, Ontario.



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JM PRODUCTS

DRY TYPE TRANSFORMERS

for indoor or outdoor service!

NEW BULLETIN FREE . . .
Gives weights, sizes and performance features of Standard's dry type line.

Standard dry type transformers for light, power and control are designed for service wherever equipment is required in hazardous areas. Most major oil companies use them. Standard's compound fills the entire case, hardens and seals out lint, dust and dirt. They cut noise levels, improve regulation, reduce temperature rise and are lighter in weight and smaller in size.

Get the facts today from your nearby Standard representative or write directly to us.

Standard Transformer CO.

EXPRESS 2-1563 • WARREN, OHIO
"WHEREVER THERE IS POWER"

FATHER AND SON, Herbert F. Janick and J. David Janick of T. H. Green Electric Co., Inc , Rochester, N. Y., attended the convention of the New York State Electrical Contractors and Dealers, Inc. at Whiteface Inn.

logical as the effective date to start using N-I circuit breakers, because this is the same date that the NEC will require the installation of Type S plug fuses and fuseholders. And since both CBs and fuses perform the same function as overcurrent devices, it is reasonable to assume that it would be more equitable to start the enforcement of both at the same time.

Non-interchangeable circuit breakers and Type S fuses have one basic difference in code application. Type S fuses and fuseholders will be required in any type of occupancy in range classifications of 0-15 amps and 16-30 amps. On the other hand, N-I circuit breakers will be required only in residential occupancies, or other occupancies where proper maintenance and supervision do not exist, and they will be required only for lighting and appliance branch circuits in range classifications of 0-20 amps, 21-50 amps, and 51-100 amps.

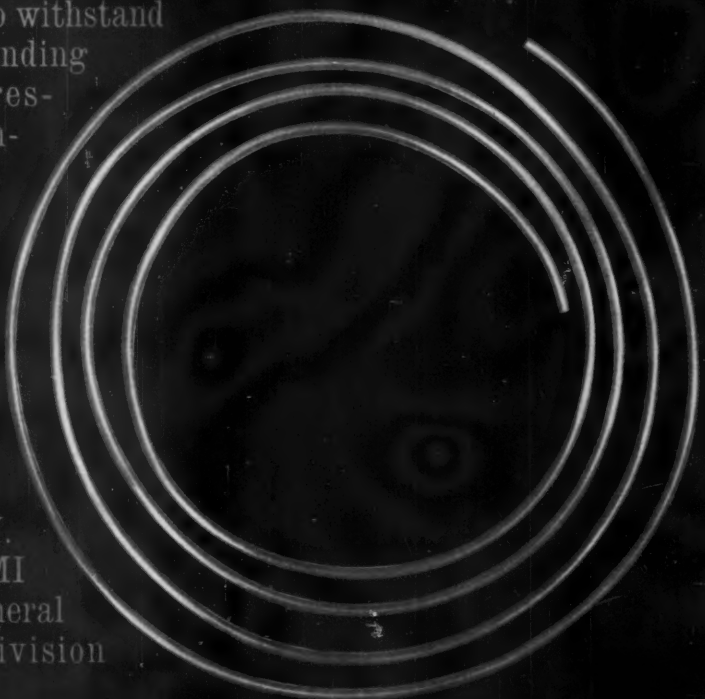
The NYBFU covers the vast majority of electrical inspections in the State of New York, and their action concerning N-I circuit breakers is a pattern similar to that being followed by a number of eastern inspection authorities.

Chicago Contractors Push Separate Bid Plan

Mechanical specialty contractors in Chicago are planning to give bid-shopping and bid-peddling a rough time. For years, these twin-evils of the single contract method of bidding building construction work have been a thorn in the side

Safety Mineral Insulated Cable for a greater variety of 600 v applications than any other wiring system*

MI Water Resistance: Impervious to water, steam, oils and solvents, MI is ideally suited for installations where these factors cause ordinary cables to break down. MI has helped eliminate costly shutdowns in dairies and food processing plants where washdowns are a daily function. **MI Heat Resistance:** Unlike any other cable system, the limiting factor for MI heat exposure is the copper components of the cable. The magnesium oxide insulation is heat-stable until well over twice the melting point of copper (1083C). With an MI system as opposed to conduit there is no need for circuitous routing to avoid contact with boilers, machines and other sources of heat. Cable operating temperature is 250C, but standard general application (Type O) and hazardous areas (Type H) seals are limited to 85C. **MI Flexibility:** No need for factory-made conduit bends...MI can be hand formed on the job and easily clipped into position. MI is able to withstand severe twisting, bending and deforming pressures because the conductors cannot shift within the highly compressed magnesium oxide insulation. For a copy of our new MI catalog, write **General Cable Corporation**, 730 Third Avenue, New York 17, N.Y. Manufacturers of MI Cable since 1941. Mineral Insulated Cable Division



Approved for hazardous areas in the 1959 National Electrical Code, Articles 330, 501, 502 and 503.

WILL YOUR "GROUNDS" CARRY IT?

During seasons of electrical storms, a careful program of checking all ground connections may save your company serious outages and property damage. Nine tenths of industrial lightning damage is reported to be on vital electrical equipment—motors, generators, transformers. Experience shows that ground resistance does not remain constant. Tests should be made at least once a year, and high ground resistance corrected.

Do You Have This Information File on Grounding?

The James G. Biddle Co. File 25 is an excellent fund of information on grounding problems. It includes a Manual on Ground Resistance Testing, and Bulletins on "Grounding Electric Circuits Effectively" and "Grounding Principles and Practices Applied to Industrial Plants."

USE THE MEGGER® GROUND TESTER

To test ground connections, the easiest, quickest, and most dependable method is the use of the Megger Ground Tester with its own hand generator for current supply. Reading the resistance value is as easy as reading a voltmeter—directly in ohms. Only *one set of connections, one operation, without any calculations.* Each instrument is self-contained, rugged, and portable. Its cost is a small fraction of the savings resulting from adequate grounding protection.

Write for Ground Testing File 25-ECM.

BIGTB

BIDDLE INSTRUMENTS

JAMES G. BIDDLE CO.

Electrical & Speed Measuring Instruments

1315 ARCH STREET • PHILADELPHIA 7, PA.

SPEAKERS on Utility day at the convention of the New York State Association of Electrical Contractors and Dealers, Inc., held at Whiteface Inn were C. W. Meytrott, vice president, Consolidated Edison Company of New York, Inc., N. Y.; W. A. Lyons, vice president, New York State Electric and Gas Corporation, Binghamton, N. Y.; A. C. Sugden, engineering manager, Long Island Lighting Co., Mineola, N. Y.; and J. E. Doolittle, vice president, Central Hudson Gas and Electric Corp., Poughkeepsie, N. Y.

of the mechanical contracting industry. With the progressive increase in size, complexity and cost of mechanical work, these practices have become much more serious. Reputable sources indicate that it is now possible for a bid-shopping general contractor to "auction off" from 40% to 70% of the total building construction cost to bid-peddling mechanical subcontractors. This compares to what was once a 10% to 15% slice of building costs.

Building owners seldom, if ever, benefit from the auction savings which generally accrue to the prime contractor and may end up with inferior workmanship and materials as a result of the economic squeeze on the successful bid-peddling subcontractors. On top of that, prime contractors may add a "handling charge" to the cost of each subcontract negotiated in addition to a justifiable coordinating fee.

This is the gist of the single-bid evils contained in a preface to the Chicago Plan for Separate Mechanical Specialty Contracting Bids. It was developed and approved after three years of intensive study and survey by the Coordinating Committee of Mechanical Specialty Contractors Associations of Chicago (electrical, mechanical, plumbing, ventilating and air conditioning). A questionnaire survey of architects in the Chicago area about two years ago received an extraordinary 48% response. A significant 71% of the architects replying favored

A 40-foot length of 4″ Sealtite flexible, liquid-tight conduit guards plant's main power supply

At the Thatcher Glass Manufacturing Co. in Elmira, N. Y., Sealtite conduit protects wires carrying the plant's 6600 v, three-phase power supply between the air circuit breaker and two banks of distribution transformers. The 40-foot length of 4″ I.D. Sealtite being liquid tight protects the wiring from the elements – being flexible, it greatly simplifies installation.

For even the roughest day-in, day-out weather doesn't faze this flexible, liquid-tight conduit. The tough, extruded polyvinyl jacket proves itself in arctic cold and tropical heat. It resists moisture, dirt – even salt spray and corrosive chemical fumes. Its flexibility absorbs vibration. These are some of the reasons why Sealtite often outlasts rigid conduit – why you should use it the next time you need the utmost in wiring protection.

WHERE TO GET SEALTITE – Electrical Wholesalers stock Types U.A. and E.F. Sealtite in easy-to-handle coils, in black or gray. Be certain you ask for and get the quality conduit marked "Sealtite" and "Anaconda" on the cover. Buy it in long lengths on reels or in cartons and cut it on the job without waste. Your wholesaler also stocks liquid-tight connectors. Free Booklet S-542 gives full information on Sealtite. Write: Anaconda Metal Hose Division, The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. Sealtite is approved by Canadian Standards Association.

60138

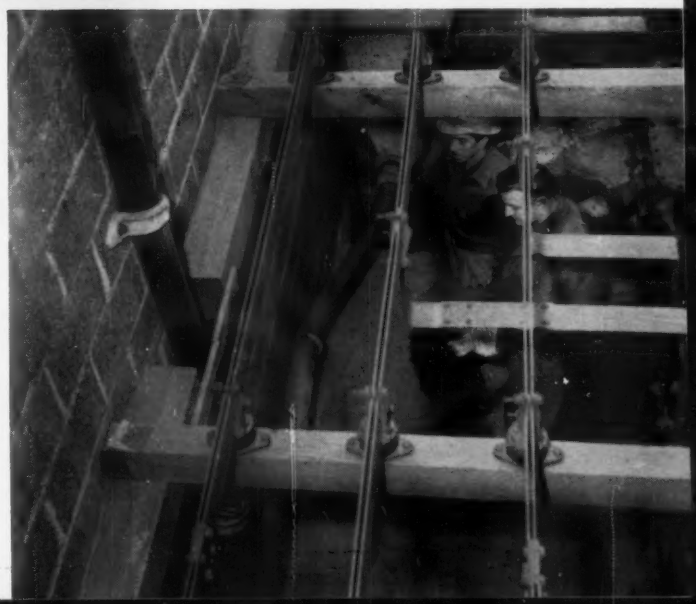
CUTAWAY SECTION of Type U. A. Sealtite shows tough polyvinyl chloride jacket over flexible metal core. Copper conductor wound spirally inside conduit provides positive ground.

Insist on the conduit marked

SEALTITE®

FLEXIBLE, LIQUID-TIGHT CONDUIT

an ANACONDA® product

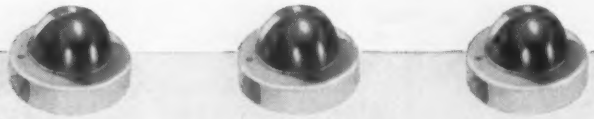


Fire detection is big business! Cash in now with Kidde equipment!

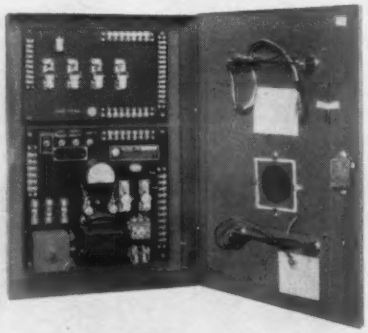
For years, schools, public buildings, businesses and homes have been waiting for an inexpensive, dependable fire detection system approved by U.L. and F.M. Now you can sell them this vital detection system at a reasonable price. When you sell a Kidde fire detection system and install it yourself, there are thousands of dollars in potential profits for you.

And, selling Kidde, you can be sure that you're selling quality. For more than 30 years, Kidde has been the leader in fire safety. It's a name you and your customers can trust!

Find out more about Kidde fire detection components—and how you can use them to cash in on these most profitable markets! For more details, write Kidde today.



Kidde Fyrindex detectors. Self-resetting, fast-acting, easy to install. Fixed-temperature units each protect up to 225 sq. ft. Rate-of-temperature-rise models protect to 900 sq. ft. Combination rate-of-rise, fixed-temperature units each protect 2500 square feet. All U.L. and/or F.M. approved.



Control, rectifier, zone annunciator panels contained in one cabinet. Monitors up to ten zones. 12 or 24 v., dc.

Kidde weatherproof alarm bells — 6″, 8″, and 10″ diameter. U.L.-approved.

Manual alarm pull for one or more stations.

Kidde **Kidde Ultrasonic & Detection Alarms, Inc.**
985 Brighton Road, Clifton, New Jersey

A Subsidiary of Walter Kidde & Company, Inc., Belleville 9, N. J.

PENNSYLVANIANS attending NISA's annual convention in Miami Beach early in May were (l to r): Ralph Kufen, Kufen Electric Motors, Warminster, Pa.; John H. Boyer, General Electrical Service Co., Inc., Harrisburg, Pa.; and George McDaniels, Kufen Electric Motors, Warminster, Pa.

separate bids and nearly half of them added their own comments about bidding procedures in the building construction industry. And the Committee notes that many general contractors, individually if not collectively, have come to realize that there is considerable merit in bid separation from the standpoint of the general contractor.

The Chicago Plan

Chicago's bid-separation plan is simple and straight-forward. It recommends the following five-step bidding procedure:

1. Preparation of separate-specifications for each of these four categories of mechanical specialty work:
   a. Plumbing and sewerage.
   b. Heating, piping, refrigeration and automatic temperature control systems.
   c. Ventilation and distribution systems for conditioned air.
   d. Electrical installations.
2. Taking of separate bids from reputable contractors on each of these four classes of work.
3. Letting of separate contracts to the low bidder, if qualified, in each category.
4. Provision for optional assignment of mechanical specialty contracts.
5. Stipulation of direct payments to mechanical specialty contractors, in the event these contracts are assigned.

The optional assignment recommendation covers those instances where it may be preferable to place all coordination and supervision under the general contractor. Then the mechanical contracts, after they have been awarded, would be assigned to the general contractor. If this is contemplated, the original

Meet a new kind of fluorescent fixture. Its name: *Corona*. You'll find it specified by architects and engineers wherever there is call for a fixture that is decorative as well as functional. A finely crafted walnut frame surrounds the diffusing pane, while birch baffles cut a pleasing modular pattern across its surface. The effect is warm...friendly...informal. Although contemporary in styling, *Corona* is completely harmonious with traditional interiors, both residential and commercial. Optically, it is all that you might expect in a fine lighting instrument engineered by Lightolier. Surface or stem mounted, in four sizes: 54" x 54", 30" x 30", 32" x 54", 16" x 54".

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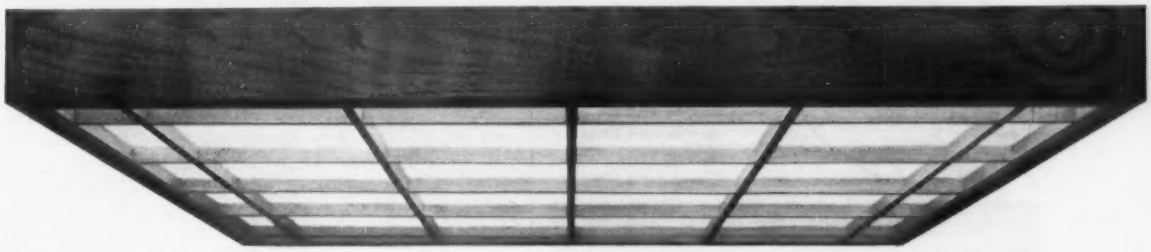

To learn more about Corona and other surface and pendant fixtures, write today for a complete brochure to Dept. EC9

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USE DIAMOND
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Where holding power counts . . . use this expansive anchor . . . for all kinds of masonry
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Forged Aluminum Anchor and Hot Galvanized Nail Assembly. Size range: 3/16" to 1/2" dia. — 7/8" to 3 1/2" length.
Only 3 steps to install in 20 seconds,
TRIAL OFFER: Write for catalog sheet and trial samples.
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GARWOOD, NEW JERSEY
700 lbs.

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ELECTRIC HEAT
THERMOSTAT
for better control of electric heat
Here's a thermostat that responds faster to both convective and radiant heat. And, it gives more convenience in setting room temperature accurately. As the large dial is turned, each "click" is a change of one degree! You'll like it, too, for its easier wiring, faster installation. Write for Bulletin 3205 . . . it's free.
PENN CONTROLS, INC. Goshen, Indiana
EXPORT DIVISION: 27 E. 38th ST., NEW YORK, N. Y.
AUTOMATIC CONTROLS FOR HEATING, REFRIGERATION, AIR CONDITIONING, APPLIANCES, PUMPS, AIR COMPRESSORS, ENGINES

specification and bid form would provide for a specific, definitive amount for a supervision-coordination fee.

The Chicago Plan already is incorporated in "The Illinois Purchasing Act." An amendment signed into law July 24, 1959 requires separate specifications and bids for the four categories noted above on all State building construction where the estimated entire cost exceeds $25,000.

It is the firm conviction of the Mechanical Specialty Contractors Coordinating Committee that the Chicago Plan can appreciably cut construction costs and eliminate bid-shopping, bid-peddling, broker-contractors, and uncontrolled and unwarranted "private auction" of subcontracting work. To that end, they are promoting its application to all building construction work, public and private, seeking the cooperation and support of every architect, consulting engineer, owner and legitimate general contractor. A brochure explaining the plan and its advantages is being widely circulated among bidding authorities and interested general contractors. Should anticipated support be lacking, the subcontractor group vows to continue alone in its battle for fair bidding practices.

The Coordinating Committee of Mechanical Specialty Contractors Associations of Chicago, authors and sponsors of the Chicago Plan, represent the Electrical Contractors Association of City of Chicago, Mechanical Contractors Chicago Association, Plumbing Contractors Association of Chicago, and the Ventilating and Air Conditioning Contractors Association of Chicago.

Drucker Teaches CCECA Estimating Course

Among the services offered members of the Cook County Electrical Contractors Association, Chicago, is an electrical estimating course. For the past decade these courses have been run on an approximate annual basis with 8 consecutive weekly sessions of three hours each. General format includes lecture, round-table discussion and workshop techniques. Course enrollment normally is limited to 30 people to permit greater latitude in individual help and attention when needed.

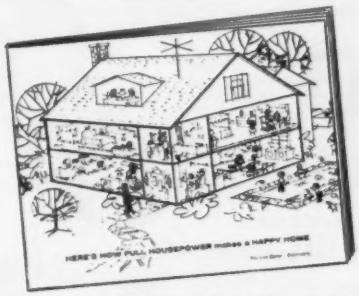
Instructor for the 1960 Course

Put the Earning Power of HOUSEPOWER to work for you NOW

More people than ever *need* full Housepower . . . more people than ever *want* full Housepower . . . and this fall more people than ever are being told *how to get* full Housepower—from *you.*

Plan right now to get your fall sales program underway. Here are the elements that are going to help you make more profits.

This ad in *The Saturday Evening Post* shows housewives how they can operate a dozen appliances at one time when they have full Housepower.



A brand new colorful booklet for your customers features the specialty devices and fixtures which put the earning power in Housepower for you. Ideal as a sales aid on the job—or for mailing to customers. 16 pages. Order your supply now. Free copy on request.

Two full color ads, sponsored by Edison Electric Institute, are appearing in *Better Homes & Gardens.* In the October issue, the National Wiring Bureau will run a one-column adjacent ad telling readers that the way to get full Housepower is to call *you.*

The "Happy Home" idea is carried through in a series of ad mats to help you launch your sales program . . . and keep it going. Your name, address and phone number are all you have to add. Order now. Or write for free proof sheet showing mats in their actual size.

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...a sponsor of

HOUSEPOWER

National Wiring Bureau
155 East 44th Street, New York 17, New York

☐ Please send me_____copies of the new sales-making booklet titled "FULL HOUSEPOWER MAKES A HAPPY HOME." Cost: $9.00 per 100. Cat. No. A-4.

☐ Please send me_____sets of the "Happy Home" ad mat series, six ad mats to the set. Cost $2.50 per set. Cat. No. M-1200.

☐ My check for $_____is enclosed. ☐ Please bill me.

Name_____

Organization_____

Street_____

City_____ Zone_____ State_____

EC&M 1060

SHERMAN TERMINAL LUGS AND CRIMPING TOOLS

SPEED INSTALLATION – REDUCE COSTS!

MONEY SAVER
SAVE UP TO 15%
WITH SHERMAN
Write for FREE Sample

SHERMAN UNI-CRIMP LUG

SHERMAN "ST" LUG

SHERMAN HAND CRIMPING TOOLS
Portable or bench mounted for fast, easy installation of money-saving Sherman terminal lugs.

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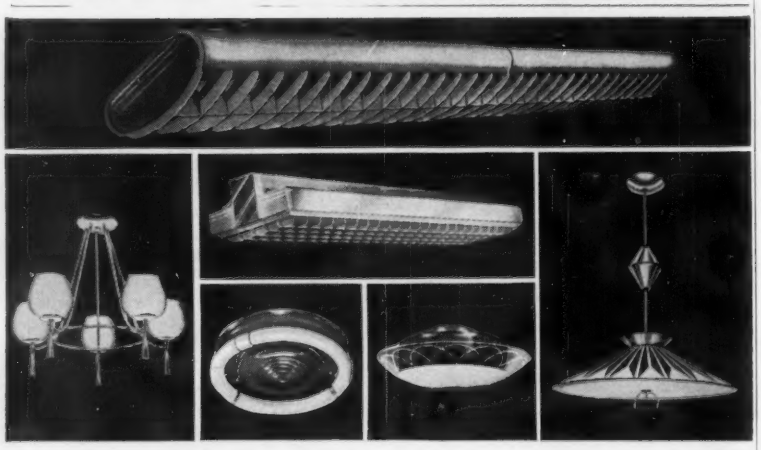

FOR LONGER PROFITS . . .
buy quality lighting fixtures direct from factory

You can make more profit on lighting fixtures with the 'Site Saver' line. Sold direct, the low prices of these fixtures enables you to beat local and mail order competition...and still make a longer profit.

All fixtures absolutely guaranteed to meet with your approval. We certify highest quality and finest workmanship because . . . we make every item in the line . . . from glass bending and decorating to metal fabrication and finishing.

Here's the largest, most complete selection of fluorescent and incandescent fixtures offered by one manufacturer. Buying from one source saves you time and trouble. And you increase profits with 'Site Saver' lighting fixtures.

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UNION WIRED, AFL-IBEW LABEL

INTERNATIONAL LIGHTING, INC. • 1825 N. 19th St., St. Louis 6, Mo.
DESIGNERS • MANUFACTURERS • MAin 1-0600

INSTRUCTOR DRUCKER reverts to a blackboard session to teach CCECA contractors the fine points of estimating fire alarm system work for existing buildings. Basic estimating course covered eight weekly three-hour classes in Chicago.

was Irv Drucker, an electrical consultant and engineer-estimator for Brown Electric Service in Chicago. Under his tutelage some 30 "students" learned the fundamental mechanics of estimating. Drucker's course material covered such subjects as: take-off techniques and estimating methods; contractor costs, markup, overhead, productive labor; development, use and breakdown of labor units; development of unit prices; mechanics of estimating medium industrial projects; estimating work in existing structures, revision work, exit signs and fire alarm systems.

General student concensus at the completion of the course was that the time and registration fees were well spent. All agreed they gained a broader concept of the art of estimating; felt they were better prepared for their daily chores; wanted

CONCENTRATING on instructor's advice during Cook County Electrical Contractors Association Estimating Course are Kurt Arntzen, Arntzen Electric Co., Chicago; and Louis Palacios, Johnson Electric Co., Des Plaines, Ill.

YOU ASKED FOR IT— the May 1960 feature section of Electrical Construction and Maintenance now in a handsome hard-cover book.

CONSTRUCTING ELECTRICAL SYSTEMS

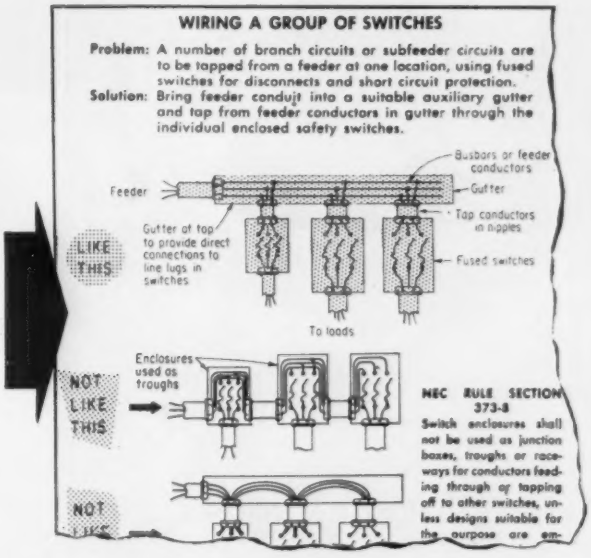
by J. F. McPartland and the Editors of Electrical Construction and Maintenance

Here's a modern, comprehensive reference and instruction manual on the methods and techniques used in constructing systems for power, light, signals and communications. Covering the best practice on selecting, mounting, connecting and housing all types of electrical equipment, **this manual presents *1959 National Electrical Code data* relating to installation. And a wealth of special illustrations are used throughout to clarify fine code points.**

Chapters are broken down on the basis of types of equipment to facilitate ready reference: lighting equipment – motors and controllers – conductors – raceways – switches – overcurrent protective devices – switchboards and panelboards – transformers – capacitors and regulators – power sources – high voltage – signals and communications.

CONTRACTORS – Get copies of this book for your job superintendents, foremen and estimators. They'll appreciate the gesture and you'll get a high return on your investment.

ENGINEERS – This book is a bonanza of information in the area where electrical design encounters most difficulty. Get copies for your key designers, junior engineers and draftsmen working into design.


WIRING A GROUP OF SWITCHES
Problem: A number of branch circuits or subfeeder circuits are to be tapped from a feeder at one location, using fused switches for disconnects and short circuit protection.
Solution: Bring feeder conduit into a suitable auxiliary gutter and tap from feeder conductors in gutter through the individual enclosed safety switches.
Busbars or feeder conductors
Feeder
Gutter
Tap conductors in nipples
LIKE THIS
Gutter at tap to provide direct connections to line lugs in switches
Fused switches
To loads
Enclosures used as troughs
NOT LIKE THIS
NEC RULE SECTION 373-8
Switch enclosures shall not be used as junction boxes, troughs or raceways for conductors feeding through or tapping off to other switches, unless designs suitable for the purpose are em-

PLANT ELECTRICAL PEOPLE – This book should be in the reference library of plant electrical engineers, electrical supervisors and electricians.

ELECTRICAL INSPECTORS – Here's a unique presentation of code rules in combination with specific installation details taken from modern practice. The correlation between code generalities and actual job specifics will assist inspectors in many difficult rulings.

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General Considerations
Luminaires and Lighting Equipment
Motors and Controllers
Conductors
Raceways
Switches
Overcurrent Protective Devices
Switchboards and Panelboards
Transformers
Capacitors and Regulators
Power Sources
High Voltage
Signals & Communications

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PLEASE PRINT

"CONSTRUCTING ELECTRICAL SYSTEMS"
Electrical Construction and Maintenance
330 West 42nd Street, New York 36, N.Y.

Please send me ____ copy (copies) of the book, "Constructing Electrical Systems," at $4.50 each.

☐ Payment enclosed. ☐ Please bill me. ☐ Bill Company.

Ship to:
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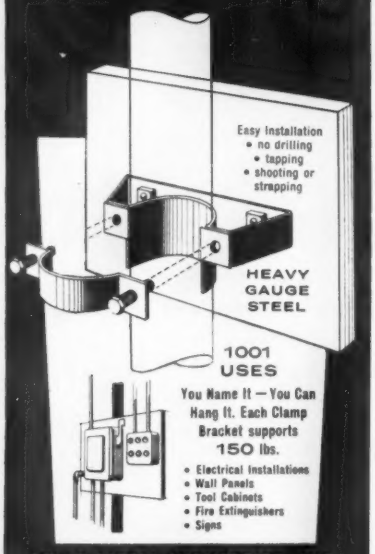
PUT LALLY COLUMNS TO WORK FOR YOU!
"Jiffy On" ATLAS CLAMP BRACKET



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THEME for the last meeting of the New York Section, IES, was "What Good Lighting Does for My Industry," which was answered by three separate speakers, each representing a different segment of the lighting industry. Gene Rae (2nd from left), Holophane Co., Inc., represented lighting equipment manufacturers for NEMA, and discussed the part good lighting plays in the lives and activities of people, and how manufacturers can thus contribute to the safety and comfort of people through new and improved designs. Barney Benning (center), Graybar Electric Co., Inc., represented NAED, and outlined the size and status of the lighting market, stressing the need for greater activity in relighting. Matt J. Sherwood, (2nd from right), National Electrical Contractors Association, Washington, D. C., represented NECA, and declared that electrical contractors are the KEY to more lighting sales, as they are already in daily contact with the prospects for good lighting. He also suggested that what is urgently needed are more good "lighting contractors," specialists in lighting design, sales, and installation. New York Section vice chairman Harold J. Peters is at left and William H. Keen, Section chairman, is at right.

more of the same. Based on this reaction, CCECA is thinking of sponsoring two courses in 1961. One would be on an elementary level for younger contractor personnel. The other would be on an advanced level for those who already have had the preliminary course.

Chicago Contractors Finance Training Program

Chicago electrical contractors have set up a special trust fund to defray the cost of the Electrical Apprenticeship and Training Program. Beginning July 4, 1960, all employers of Group "A" electricians represented by Local Union 134, IBEW, contribute an amount to the fund equal to ¼ of 1% of their productive labor payrolls.

The fund was established by means of an amendment to the Working Rules of a long-standing Agreement (1921) between the Electrical Contractors Association of City of Chicago and Local Union No. 134, International Brotherhood of Electrical Workers. Negotiation of the amendment was through the Electrical Joint Arbitration Board.

By definition, Productive Labor Payroll covers: All straight time wages paid to Group "A" journeymen and apprentices represented by Local 134 for all regular and overtime hours worked; also all wages paid to foremen, but not in excess of the established journeyman rate. Premium portion of wages paid for overtime hours worked is excluded.

Contractors are setting up separate liability accounts titled "Electrical Apprenticeship and Training Fund"; report and pay quarterly with special forms covering their already established Electrical Insurance Trustee Fund (for welfare purposes) and the new Training Fund (for educational purposes). The Electrical Insurance Trustee will be the Agency through which the new fund will be collected.

California Maintenance Group Names O. D. Land President

Industrial engineer Oswald D. Land, Bay Cities Floodlight and Electric Co., was inducted as 1960-61 president of the Electrical Maintenance Engineers Association on July 22nd, when members and guests convened at the Roger Young Auditorium in Los Angeles for an evening of combined business and entertainment. Installed to office with him were Urban Beh, consulting lighting engineer, as first vice president; Lloyd A. Gates, Department of Water & Power, second vice president; and William R. Paluska,

from the consulting engineering firm of Albert C. Martin, as secretary-treasurer.

Members who will serve during the next three years on the association's Executive Committee include Richard B. Hatfield, So. California Edison Co.; John Horsburgh, Kaiser Steel Corp.; Norman E. Stone and King D. Christopher, Clark Controller Co. Elected as an associate member to serve a two-year term was Robert R. Proctor, Larson-Hogue Electric Co., while K. Lee Alvey, AiResearch Mfg. Co., and William A. Rinehart, Burton Equipment Co., were selected for one-year terms.

Retiring officers and committeemen who were honored at the July meeting included Charles M. Tabor of Larson-Hogue, president; Paul H. Henrichs, So. Calif. Edison, first vice president; Frank R. Tharp, Floodlight and Fluorescent Maintenance Co., second vice president; and Frank S. Miller, Robertshaw-Fulton Controls, Grayson Div.

Chairmen who will preside over local area activities during the coming season include Walter H. Wolf, Zamboni Electric, Harbor Area; Harry M. Wallace, Westinghouse Electric Corp., "Old Baldy" Area; Morey Sherwin, Magnavox Research Laboratories, San Fernando Valley Area; Floyd J. McNeill, Western Calif. Canners, Contra Costa County Area, and Donald Higgins, American Potash and Chemical Corp., Mojave Desert Area.

Insulation Manufacturers Form Association

The National Cellulose Insulation Manufacturers Association was formed on June 21 at a meeting in Chicago of prime manufacturers in the field. The primary objectives of the association will be to further the recognition, promotion and use of cellulose insulation materials and to establish product standards for the protection of the public and the association.

O. J. Fish of the Pal-O-Pak Insulation Co., Inc., Hartland, Wis., was elected president; Paul Birkmeier, Hagan Manufacturing Co., Delphos, Ohio, vice president; Jon Oren, Insul-Cell Manufacturing Co., Muncie, Ind., treasurer; Lloyd Wheeler, Forest-Wool Insulation Co., Marshall, Mich., secretary.

The address for the NCIMA is P. O. Box 66, Delphos, Ohio.

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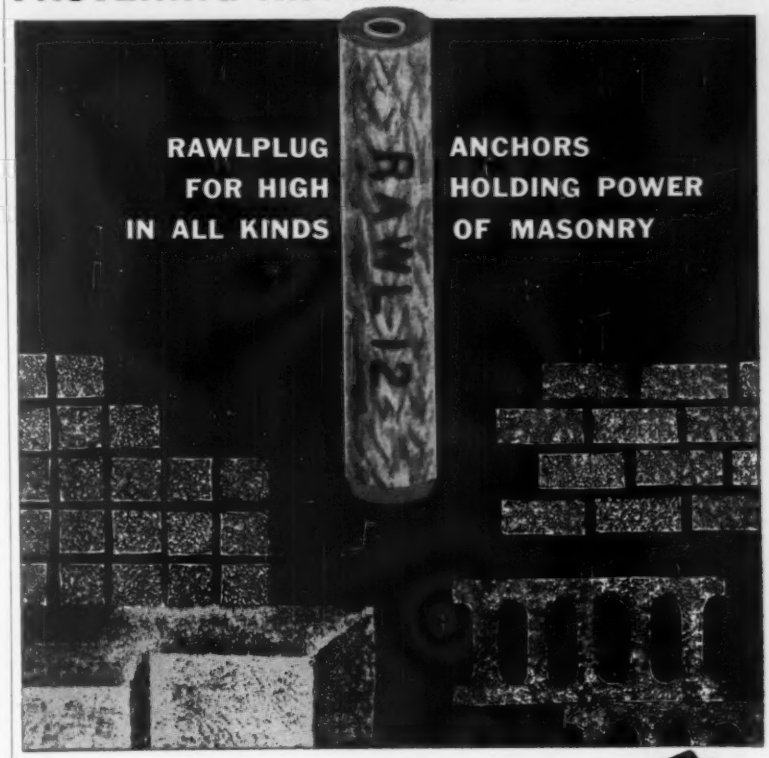

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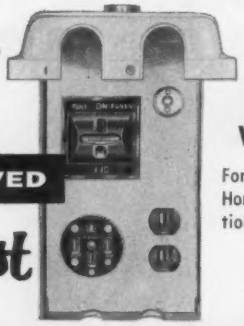

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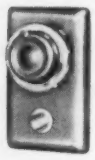

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NISA News

Several joint meetings of NISA chapters are scheduled to be held this fall:

- In San Francisco, members of the association's three California organizations, Northern California Chapter, Los Angeles Chapter and San Diego Chapter, will meet at the Hotel Jack Tar October 1.
- In Vancouver, B. C., members of the British Columbia, Oregon and Puget Sound chapters will meet October 21 at Grosvenor Hotel for the annual Pacific Northwest Conference.
- In Minneapolis, Minn., the Midwestern, North Central and Wisconsin chapters will hold the first "Tri-Chapter Conference" on September 16-17.

• • • •

Also on tap for the association's fall calendar: a "Management Seminar," conducted by the faculty of St. Louis University in St. Louis, probably in October; a third "Practical-Technical Seminar," featuring winding experiments and insulation test, probably in Ohio this month or next.

• • • •

Another big meeting: In Texas, the full conference of the Southwestern Chapter. Speakers include—

George C. Martin, Essex Wire Corp., "A Guide to the Selection of Magnet Wire"; Frank Beardslee, City of Austin, "Emergency Care of the Injured"; T. R. Warriner Jr., Warriner Hermetics Co., Fort Worth, Texas, "Practical Repair of Hermetic Refrigeration Units"; Connie H. Henry, Motor Rewinding Co., Dallas, Texas, "Morals, Money and Motors"; J. Arthur Turner Jr., NISA president.

• • • •

Two new brochures have been published by the association.

One, "Your New Emblem," describes the various materials available that incorporate the new EASA design. Electrotypes in various sizes and in one and two-colors; reproduction proofs, jewelry, truck and window decals, match books and other items formerly imprinted with the NISA emblem are now available and are described in the two-color leaflet.

The second brochure is a revision of a membership pamphlet and is entitled "We've Changed Our Name To Represent You Better." Testimonials from several EASA members in the United States and Can-

Founded as NISA in 1933

ada describe the various benefits for the independent electrical apparatus service shop of association membership.

Copies of these brochures are available without cost from association headquarters. Write Joseph M. Harrington, executive vice-president, National Industrial Service Association, Inc., 7730 Carondelet Avenue, St. Louis 5, Mo.

The new name of the association, Electrical Apparatus Service Association, Inc., becomes official April 1, 1961.

• • • •

The third quarterly meeting of the King Coal Chapter was held in St. Louis, July 22, at Henrici's Restaurant, Bel Air Motel Hotel. Eugene Baggot, Century Electric Co., described the differences between hermetic and conventional motors. Dee James and Robert McNamara of the local Insulation & Wires, Inc., office demonstrated silicone-rubber compound, plastic tubing and epoxy resin powder.

• • • •

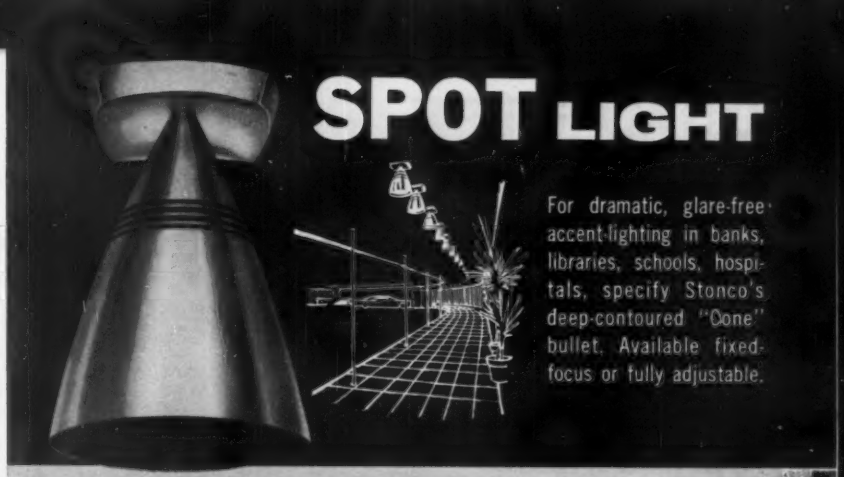
Great Lakes Chapter's annual golf tournament was held September 8 at Warwick Hills Golf Club, Grand Blanc, Mich. Joseph F. Dudley, Dudley Electric Co., Flint, Mich., was host. The chapter's next meeting will be held in Ann Arbor, Michigan, with the Western Michigan Chapter, with the Hoover Ball and Bearing and the General Bearing Companies as hosts.

• • • •

The Rocky Mountain Chapter will hold its fall meeting in Albuquerque, N. M.

• • • •

Exhibit space for the 28th Annual Convention of the association —in San Francisco's Jack Tar Hotel, June 11-14, 1961—is being arranged by the association's national headquarters in St. Louis. Information and prices may be obtained by writing Mr. Harrington at the address given above.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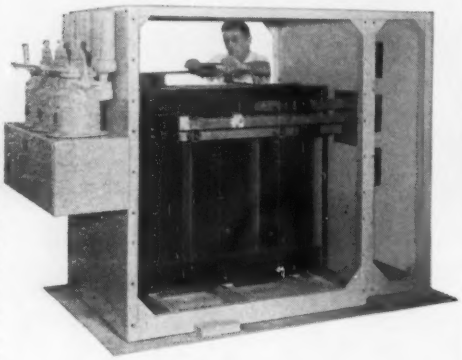

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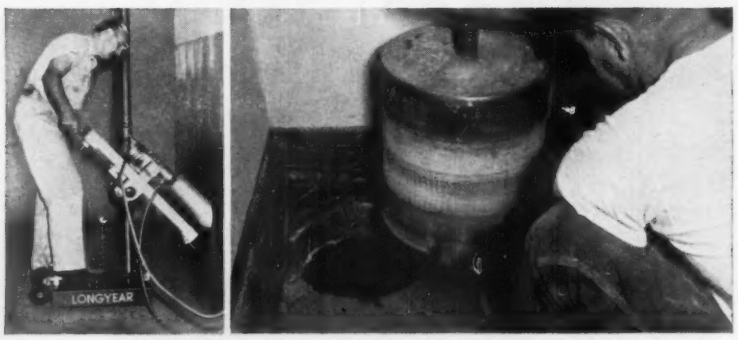

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DATES AHEAD

International Association of Electrical Inspectors — Northwestern Section, Sheraton-Portland Hotel, Portland, Ore., September 12-14; **Southwestern Section,** Mapes Hotel, Reno, Nev., September 19-22; **Eastern Section,** Wentworth-By-The-Sea, Portsmouth, N. H., September 26-28; **Western Section,** Continental Hotel, Kansas City, Mo., October 3-5; **Southern Section,** Rice Hotel, Houston, Texas, October 17-19; **Canadian Section,** Toronto, Ont., Canada, Oct. 28-29.

NISA Chapter Meetings—North Central, Midwestern and Wisconsin, Minneapolis, Minn., September 16-17; **Central Ohio,** Columbus, Ohio, September 18; **Southwestern,** Austin, Texas, September 22-24; **Northern California, Los Angeles and San Diego,** Hotel Jack Tar, San Francisco, Calif., October 1; **King Coal,** Evansville, Ind., October 13, and Mount Vernon, Ill., January 12, 1961; **British Columbia, Oregon and Puget Sound,** Grosvenor Hotel, Vancouver, B. C., October 21.

The Ninth Annual National Symposium on Industrial Electronics—Symposium jointly sponsored by AIEE and IRE, Manger Hotel, Cleveland, Ohio, September 21-22.

Inter-Industry Farm Electric Utilization Council — National Electric Farm Power Conference, Kentucky Hotel, Louisville, Ky., Sept. 21-23.

International Association of Electrical Leagues—25th annual conference, Hotel President, Kansas City, Mo., October 5-7.

National Electronics Conference—Hotel Sherman, Chicago, Ill., October 10-12.

Florida Association of Electrical Contractors—Annual Convention and 8th Electrical Trade Show, Deauville Hotel, Miami Beach, Fla., October 12-15.

48th National Safety Congress—Annual convention of the National Safety Council, Conrad Hilton Hotel, Chicago, Ill., October 17-21.

National Electrical Contractors Association—1960 annual convention, Las Vegas Convention Center, Las Vegas, Nev., October 23-27.

American Standard Assn.—11th National Conference on Standards, Sheraton-McAlpin Hotel, New York City, October 25-27.

National Fire Protection Association—Fall Conference, Columbus, Ohio, November 14-16.

National Electrical Manufacturers Assn.—Annual meeting, Traymore Hotel, Atlantic City, N. J., November 14-18.

Electrical & Home Appliance Show—Electrical Building, Balboa Park, San Diego, Calif., November 25-30.

The Third National Conference on the Application of Electrical Insulation—Co-sponsored by the AIEE and NEMA, Conrad Hilton Hotel, Chicago, Ill., December 5-8.

Industrial Heating Equipment Association, Inc.—Dearborn Inn, Dearborn, Mich., January 23-24, 1961.

Plant Maintenance and Engineering Show—International Amphitheatre, Chicago, Ill., January 23-26.

Intermountain Electrical Association—Annual conference, Hotel Ben Lomond, Ogden, Utah, February 2.

Power & Communications Contractors Association—Annual convention, Sir Francis Drake Hotel, San Francisco, Calif., February 5-7.

National Electrical Week—National promotion, February 5-12.

National Rural Electric Cooperative Association—19th annual meeting, Dallas, Texas, February 13-16.

15th International Heating & Air-Conditioning Exposition—International Amphitheatre, Chicago, Ill., February 13-16.

Upper Midwest Electrical Industry Convention — Leamington Hotel, Minneapolis, Minn., February 19-22.

National Electric Sign Association—Convention, Benjamin Franklin Hotel, Philadelphia, Pa., February 19-22.

17th Annual National Wiring Sales Conference—Sherman Hotel, Chicago, Ill., February 23-24.

Edison Electric Institute — Annual sales conference, Edgewater Beach Hotel, Chicago, Ill., March 20-22.

Institute of Radio Engineers, Inc.—International Convention and Show, Waldorf-Astoria Hotel and New York Coliseum, New York City, March 20-23.

American Power Conference—Sherman Hotel, Chicago, Ill., March 21-23.

Nebraska Iowa Electrical Council—4th Biennial Nebraska Iowa Electric Trade Show, Peony Park Auditorium, Omaha, Neb., March 21-23.

Northern California Electrical Industry Show—Sponsored by the Electrical Maintenance Engineers' Association of Northern California, Brooks Hall, San Francisco, Calif., April 5-9.

Missouri Valley Electrical Association—Annual engineering conference, Hotel President and Municipal Auditorium, Kansas City, Mo., April 12-14.

2nd Annual Alabama Electrical & Electronics Exposition—Birmingham Municipal Auditorium, Birmingham, Ala., April 17-19.

National Association of Electrical Distributors—53rd annual convention, Detroit, Mich., April 29-May 3.

Pacific Coast Electrical Association, Inc.—Annual convention, Sheraton-Palace Hotel, San Francisco, Calif., May 17-19.

Edison Electric Institute—Annual convention, New York City, June 5-7.

Electrical Apparatus Service Association, Inc.—28th annual convention, Jack Tar Hotel, San Francisco, Calif., June 11-14.

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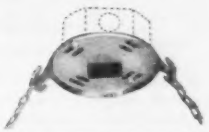

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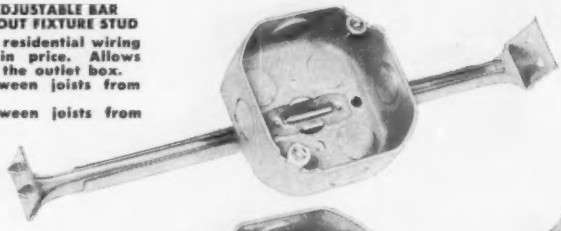

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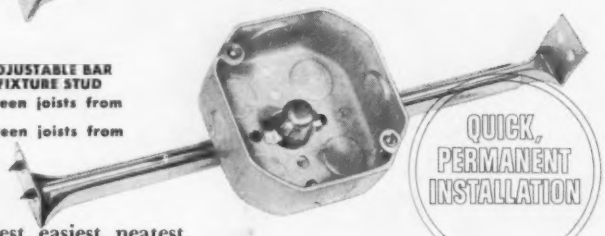

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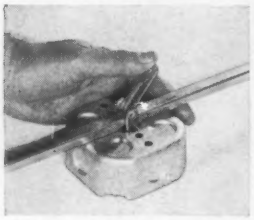

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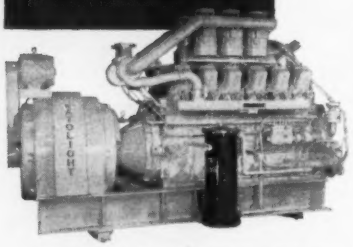

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Among the Manufacturers

Headquarters Announcements

The Gedney Electric Co. and **The Andrew Terry Co.** have been consolidated into the Gedney Electric Co., Inc., with corporate headquarters at Terryville, Conn. Officers are Dwight W. Pond, chairman of the board; Malcolm W. Heron, president; G. Philip Pond, executive vice president; and Charles W. Buell, secretary and treasurer.

Wellmade Metal Products Co., Oakland, Calif., announces the acquisition of the **Leadlight Fixture Co.,** to be known as the Leadlight Lighting Fixture Div., with Milton Kosman as sales manager.

Federal Pacific Electric Co., Newark, N. J., has acquired the **Pioneer Electric Ltd.,** Winnipeg, Canada.

Yale & Towne Mfg. Co., New York, N. Y.—Gordon Patterson, president and director.

Union Carbide Corp., New York, N. Y.—Howard S. Bunn, vice chairman of the board; Birny Mason, Jr., president.

Day-Brite Lighting, Inc., St. Louis, Mo.—James F. Whitehead, Jr., president.

Sylvania Electric Products Inc., New York, N. Y.—Arthur L. B. Richardson and George C. Connor, senior vice presidents; William F. Rueger, secretary.

Benjamin Div., Thomas Industries, Inc., Louisville, Ky. — Michael N. Flynn, sales manager.

International Rectifier Corp., El Segundo, Calif.—John D. Vickrey, sales manager, Selenium Products Div.

U. S. Industries, Inc., New York, N. Y. — Arnold P. Moran, vice president-treasurer; I. John Billera, executive vice president—operations.

Multi-Amp Electronic Corp., Union, N. J.—Ralph J. Dikeman, Jr., marketing manager.

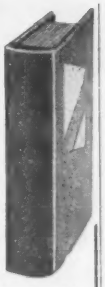
The Euclid Electric & Mfg. Co., Cleveland, Ohio—Carl R. Roehrer, sales manager.

General Electric Co., Schenectady, N.Y.—Robert B. Kurtz, general manager, General Purpose Control Dept., Bloomington, Ill.

Daystrom, Inc., Murray Hill, N. J.—Edward J. Querner, vice president and general manager, Transicoil Div., Worcester, Pa.

U. S. Rubber Co., New York, N. Y.—J. J. Orr, director of engineering.

ELECTRICAL CIRCUITS AND MACHINES



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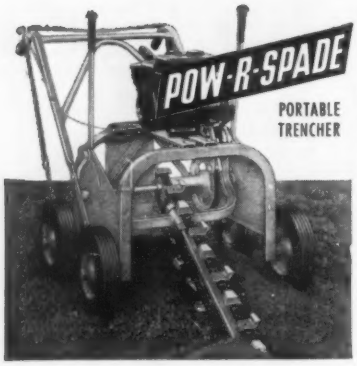

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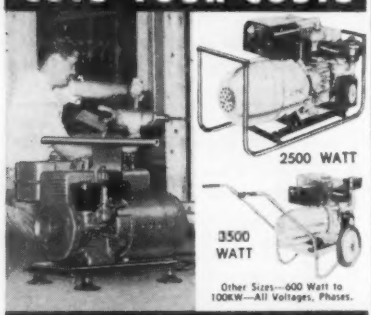

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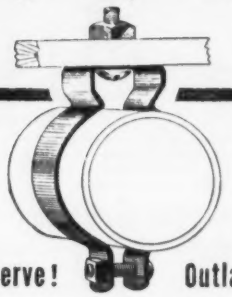

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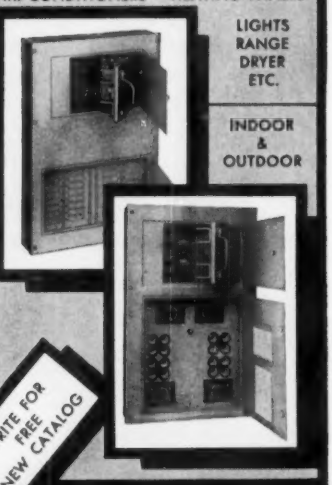

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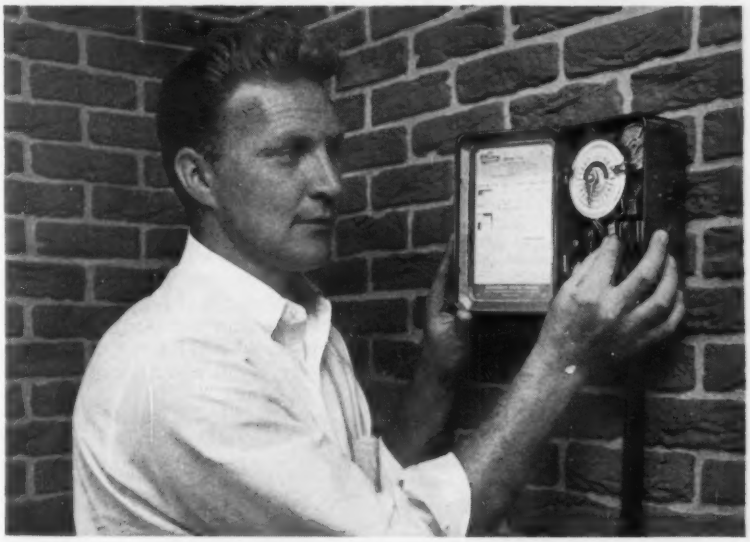

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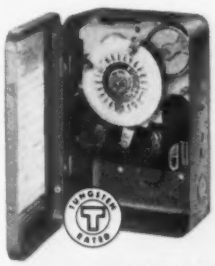

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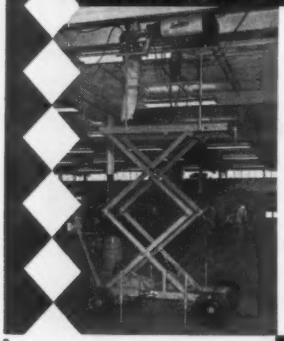

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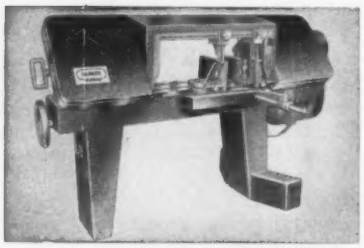

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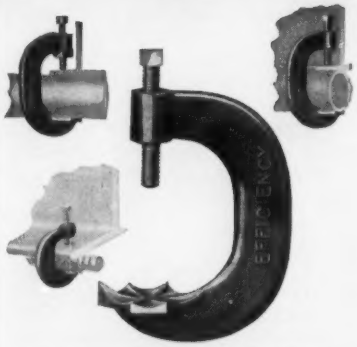

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VOLTAGE DROP IN APARTMENT HOUSES

(FROM PAGE 106)

of the results of voltages higher than nameplate. But that this is by no means a subject to be neglected is well illustrated by the following excerpts from a well-known manufacturer's statement to us:

"In regard to voltages over 115 volts ac, radios and television receivers will require more frequent servicing. Our experience over the years leads us to believe that the life of the small vacuum tube is shortened when equipment is running on ac lines with input over 125 ac."

And from the same manufacturer:

"In regard to our air conditioners . . . A higher than 110% input voltage (i.e., 110% of 115 volts or 126.5 volts), can damage the protection relay employed in our units . . ." All manufacturers place a consistent limit of 125 to 126.5 volts on their equipment.

Let us consider the implications of these statements in regard to line voltage drops:

(1) We have already stated a fact which everyone knows—that the service supply voltage normally rises during off-peak periods. Our assumption of 123 volts is probably conservative, and the utilities can confirm that they have more trouble with over-voltage complaints than with under-voltage.

(2) Let us also remember that under off-peak conditions our peak feeder drop of 3½% may diminish to one or two volts, and with a 1% design to practically nothing.

(3) Under these conditions aren't we approaching the 125-126.5-volt limit too closely for comfort (with the 5-volt drop) and much too closely for safety with the 1% drop?

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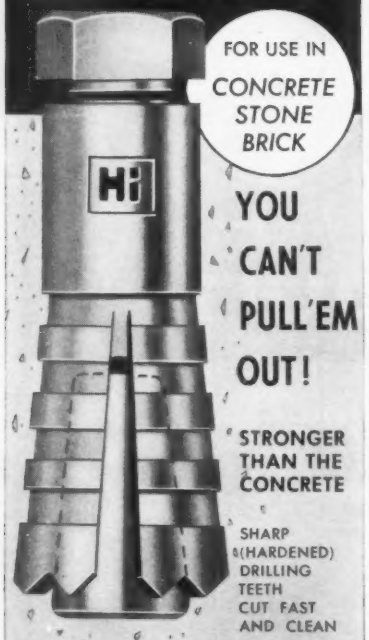

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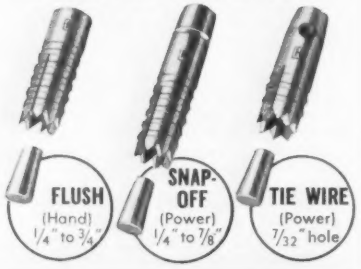

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LUMINOUS DOME SOLVES GLARE PROBLEM

[FROM PAGE 109]

the centerline strong-back. For cleaning and relamping, this process is reversed, progressively pulling fixtures along cable supports until they can be reached from the surrounding crawlspace, then uncoupling, unsnapping and removing them until the job is completed.

As noted in an accompanying photo, end chassis in each row are fitted with longer flexible pigtails equipped with plugs that connect into duplex receptacle boxes mounted around the skylight rim. Boxes are connected to each other and to the master control panel by curved lengths of rigid conduit.

Aluminum Umbrella

The third major assignment was to create a large-area reflecting surface above the lamps, and this was accomplished by constructing a 45-ft-dia aluminum canopy or "umbrella" which was suspended approximately 2 ft above the lamps and supported by rod hangers attached to exterior roof purlins and hip beams.

Since aluminum sheeting used for the canopy was corrugated, interflection of light between lamps and skylight topside is effectively "scattered" to promote diffusion. Installation of the canopy also blocked out all natural light, thereby eliminating the wide variations between glare and gloom that previously were so objectionable. And finally, as added insurance against natural spill-light infiltration, the exterior clear-glass roof was painted a dark grey on the underside.

Results of the installation have been highly gratifying to all concerned, for the job was completed well within budget limitations; the obtained lighting intensity on working areas is now an even 50 fc; the aesthetic beauty has been enhanced; and a difficult maintenance problem has been solved.

This lighting installation is also unusual in that it was completely designed, promoted and installed by the electrical contractor, who developed the solution, assembled all supporting data, rendered the necessary installation drawings, and purchased all required materials. Sol Cohn of the California Supply Co., cooperated as consultant on fixture design.

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CONDUCTOR FILL IN RACEWAYS

[FROM PAGE 113]

At the bottom of Table C, the 50% area fill of a 1-in. conduit is given as 0.43 sq in. Therefore, the combinations in this example are well below the maximum permitted 50% fill (0.3378 sq in. represent about a 40% fill of a 1-in. conduit).

There may be occasions where rubber-covered conductors are preferred for rewiring an existing concealed conduit to the allowable 50% fill. In such instances, use the conductor dimensions given in Table A and the conduit percentage fills at the bottom of Table C.

While accompanying Tables A and C have been developed primarily for computing conduit sizes for different size conductors, the conductor dimensions given in these tables may be used to determine the size of other types of raceways.

For wireways, underfloor raceways and similar raceway systems, manufacturers provide appropriate tables for the number of conductors (T or R) permitted in each respective raceway size. Such tables are contained in each manufacturer's pamphlet describing the particular raceway. Because of the wide variety of raceway sizes other than conduits, it would not be possible to include such data in this article.

However, when the cross-sectional area of a particular raceway is known, Tables A and C may be used to determine any combination of R or T conductors that can occupy the raceway. For underfloor and cellular metal or concrete floor raceways, a 40% conductor fill is permitted. In wireways and auxiliary gutters, with minor exceptions, conductor fill cannot exceed 20% of the raceway cross-sectional area, and the number of wires is generally limited to 30.

In NEC Table 6, Chapter 9, representative values are given for lead-covered conductors. And NEC Table 7, Chapter 9 gives the dimensions for Type AVA, AVB and AVL conductors.

For any other type of conductor, the overall conductor cross-sectional area is determined by the formula:

$$CSA = D^2 \times 0.7854.$$

Where: CSA = cross-sectional area in sq in. of conductor and insulation; and D = cross-sectional diameter of conductor and insulation in inches.

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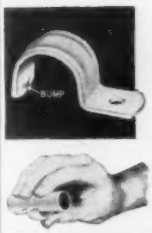

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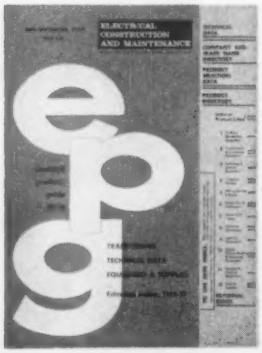

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For more complete information, and application data on their lines, refer to the index of Advertisers in the ELECTRICAL PRODUCTS GUIDE . . . the 13th issue of ELECTRICAL CONSTRUCTION AND MAINTENANCE.

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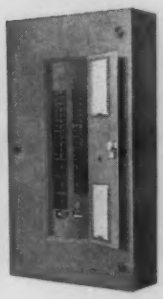

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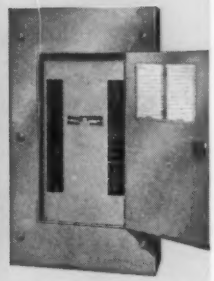

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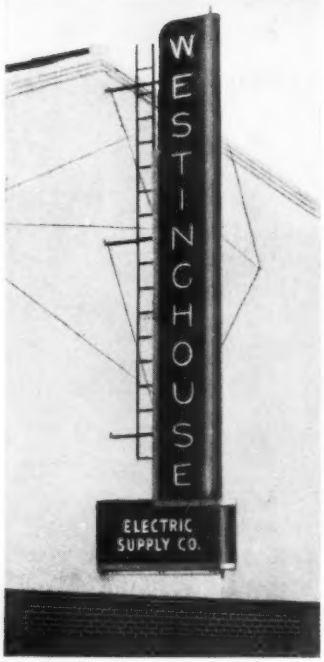

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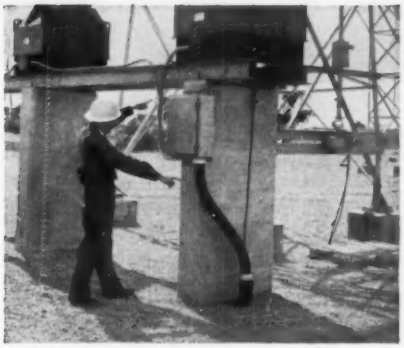

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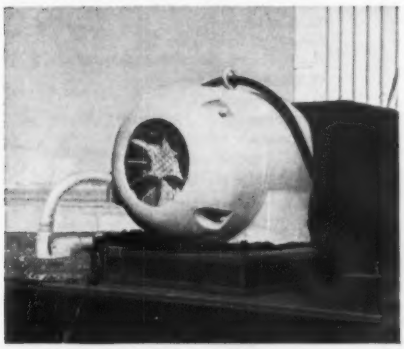

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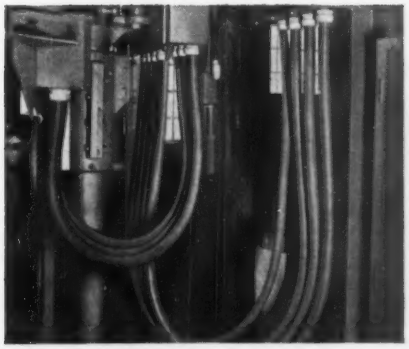

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It is being used successfully in wet locations, in tunnels, power plants, steel mills, canneries, chemical industries and in many outdoor applications. Sealtite comes in four types:

TYPE U.A. — TYPE C.S.A. Specifications for Type U. A. (Underwriters' Laboratories Listed) and Type C. S. A. (Canadian Standards Association Approved). Construction: flexible galvanized steel core, positive ground and tough extruded outer cover.

TRADE SIZE (Ins.)	INSIDE DIAMETER Min.	INSIDE DIAMETER Max.	OUTSIDE DIAMETER Min.	OUTSIDE DIAMETER Max.	Appr. Inside Bend Diam. (Ins.)	Approx. Shipping Wgt. (Lbs.) Per Std. Carton
⅜	.484	.504	.690	.710	6	60
½	.622	.642	.820	.840	7	70
¾	.820	.840	1.030	1.050	10	70
1	1.041	1.066	1.290	1.315	12	90
1¼	1.380	1.410	1.630	1.660	15	70

TYPE E.F.† (Extra Flexible)—for machine tools and industrial equipment. (Meets J.I.C. requirements). Available in black, gray or white.

TYPE H.C. (Hot-Cold)—for temperatures from +221° F to −40° F.

TRADE SIZE (Ins.)	INSIDE DIAMETER Min.	INSIDE DIAMETER Max.	OUTSIDE DIAMETER Min.	OUTSIDE DIAMETER Max.	Appr. Inside Bend Diam. (Ins.)	Approx. Shipping Wgt. (Lbs.) Per Std. Carton
⅜	.485	.505	.690	.710	4	60
½	.620	.640	.820	.840	5	60
¾	.815	.835	1.030	1.050	5	70
1	1.030	1.055	1.290	1.315	7	60
1¼	1.370	1.395	1.635	1.660	8	80
1½	1.575	1.600	1.875	1.900	11	55
2	2.020	2.045	2.350	2.375	14	75
2½	2.480	2.505	2.850	2.875	19	105
3	3.070	3.100	3.470	3.500	23	80
4	4.000	4.040	4.460	4.500	27	105

Commercial tolerances apply on above figures.

ELECTRICAL WHOLESALERS stock Sealtite. Buy it in long, random lengths on nonreturnable wooden reels, at no extra cost. Available in sturdy cartons that are easier to store and carry to the job. Liquid-tight connectors also are available from wholesalers' stocks. For information write: Anaconda Metal Hose Division, The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

†Pat. applied for 8014GR

CUTAWAY SECTION of Type U.A. Sealtite shows tough polyvinyl chloride jacket over flexible galvanized steel core. Copper conductor wound spirally inside conduit gives positive ground.

Insist on the conduit marked

SEALTITE®

Flexible, Liquid-Tight Conduit

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Air Conditioners — unit type
Alarms — fire
Ammeters — panel, pocket, recording
Annunciators — drop, lamp, electric reset
Batteries — wet and dry
BELLS — hazardous location bells, buzzers and horns; also standard types
Blocks — terminal
BOXES — metal outlet and switch
Boxes — all other types
Breakers — oil and air circuit
Bulbs — incandescent
BUS-DUCT
Cabinets — cutout, distribution, fuse panelboard, transformer
CABLE — rubber-covered
Cable — all other types
Capacitors
Centers — load and distribution
Compounds
Conduit — clay, flexible metallic
CONDUIT — flexible, non-metallic, rigid steel
Connectors — all types
CORD — twisted or parallel
Cord — all other types
Cutouts
DRILLS — portable electric
Duct — power, underfloor
Fans — attic, ventilator, propellor; blowers
FANS — exhaust
Fittings — conduit and cable, all kinds
FIXTURES — commercial and industrial incandescent
Fixtures — commercial and industrial fluorescent
Fixtures — floodlighting, street lighting
Fixtures — hazardous location, vaportight
FUSES — renewable plug
Fuses — all other types
Hangers — conduit, fixture, outlet box
HEATERS — space
Horns — signal
LAMPS — fluorescent tube
Lamps — incandescent
Lamps — all other types
Lugs — solderless
METERS — watt-hour testing
MOTORS — AC single phase
Motors — all other types
Outlets — hanger
PANELBOARDS
Plugs — all types
Receptacles — all types
RELAYS — electronic industrial
SIGNALS — nurse and doctor call
Sirens — electric
Sockets — all types
Solenoids — AC, DC, rotary
STARTERS — AC and DC motor
Switchboards
SWITCHES — combined circuit breaker and starting
Switches — all other types
Switchgear — metal-clad
SYSTEMS — intercommunicating
Systems — calling, signaling, public address
TAPE — friction
Tape — all other types
Tools — hand and power, all types
TRANSFORMERS
Tubes — electronic
Ventilators
Voltmeters — panel, pocket, portable
WIRE — rubber-covered
Wire — all other types

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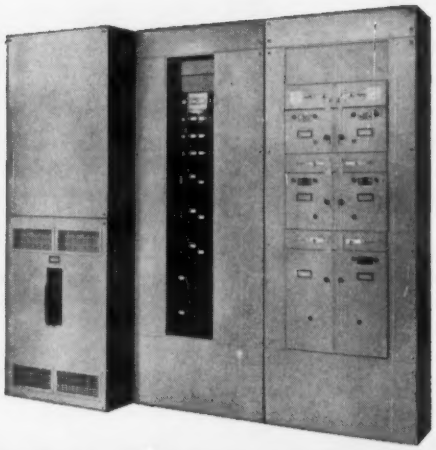

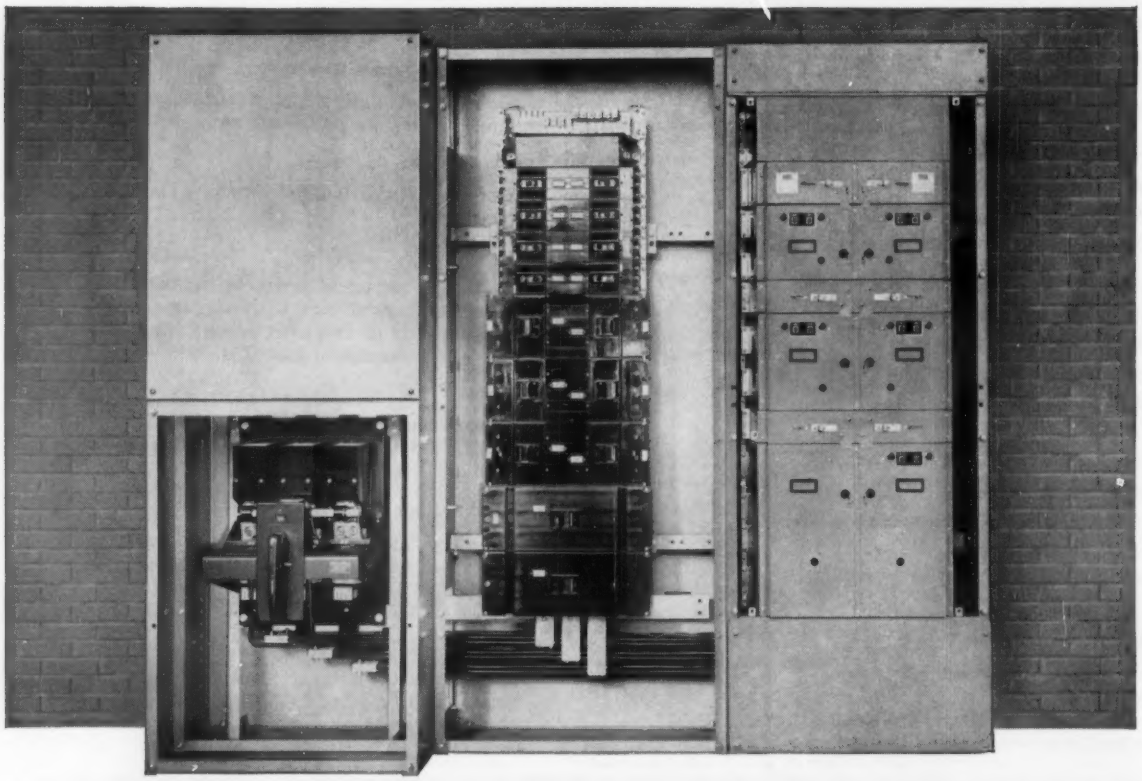

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GRAPHICAL SYMBOLS FOR ARCHITECTURAL PLANS

Ceiling Wall

GENERAL OUTLETS

- Outlet
- (B) Blanked Outlet
- (D) Drop Cord
- (E) Electric Outlet; for use only when circle used alone might be confused with columns, plumbing symbols, etc
- (F) Fan Outlet
- (J) Junction Box
- (L) Lamp Holder
- (L_{PS}) Lamp Holder with Pull Switch
- (S) Pull Switch
- (V) Outlet for Vapor Discharge Lamp
- (X) Exit Light Outlet
- (C) Clock Outlet (Specify Voltage)

CONVENIENCE OUTLETS

- Duplex Convenience Outlet
- $\ominus_{1,3}$ Convenience Outlet other than Duplex 1=Single, 3=Triplex, etc
- $\ominus_{WP}$ Weatherproof Convenience Outlet
- $\ominus_{R}$ Range Outlet
- $\ominus_{S}$ Switch and Convenience Outlet
- $\ominus$(R) Radio and Convenience Outlet
- Special Purpose Outlet (Des. in Spec.)
- Floor Outlet

SWITCH OUTLETS

- S Single Pole Switch
- S_2 Double Pole Switch
- S_3 Three Way Switch
- S_4 Four Way Switch
- S_D Automatic Door Switch
- S_E Electrolier Switch
- S_K Key Operated Switch
- S_P Switch and Pilot Lamp
- S_{CB} Circuit Breaker
- S_{WCB} Weatherproof Circuit Breaker
- S_{MC} Momentary Contact Switch
- S_{RC} Remote Control Switch
- S_{WP} Weatherproof Switch
- S_F Fused Switch
- S_{WF} Weatherproof Fused Switch

SPECIAL OUTLETS

$O_{a,b,c,etc}$
$\ominus_{a,b,c,etc}$
$S_{a,b,c,etc}$

Any standard symbol as given above with the addition of a lower case subscript letter may be used to designate some special variation of standard equipment of particular interest in a specific set of architectural plans.

When used they must be listed in the Key of Symbols on each drawing and if necessary further described in the specifications.

PANELS, CIRCUITS, AND MISCELLANEOUS

- Lighting Panel
- Power Panel
- Branch Circuit; Concealed in Ceiling or Wall
- Branch Circuit; Concealed in Floor
- Branch Circuit; Exposed
- Home Run to Panel Board. Indicate number of circuits by number of arrows. Note: Any circuit without further designation indicates a two-wire circuit. For a greater number of wires indicate as follows: -//- (3 wires) -##- (4 wires), etc.
- Feeders. Note: Use heavy lines and designate by number corresponding to listing in Feeder Schedule.
- Underfloor Duct and Junction Box. Triple System. Note: For double or single systems eliminate one or two lines. This symbol is equally adaptable to auxiliary system layouts.
- (G) Generator
- (M) Motor
- (I) Instrument
- (T) Power Transformer (Or draw to scale.)
- Controller
- Isolating Switch

AUXILIARY SYSTEMS

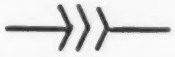
- Pushbutton
- Buzzer
- Bell
- Annunciator
- Outside Telephone
- Interconnecting Telephone
- Telephone Switchboard
- (T) Bell-Ringing Transformer
- (D) Electric Door Opener
- (F) Fire Alarm Bell
- (F) Fire Alarm Station
- City Fire Alarm Station
- (FA) Fire Alarm Central Station
- (FS) Automatic Fire Alarm Device
- (W) Watchman's Station
- (W) Watchman's Central Station
- (H) Horn
- (N) Nurse's Signal Plug
- (M) Maid's Signal Plug
- (R) Radio Outlet
- (SC) Signal Central Station
- Interconnection Box
- Battery
- Auxiliary System Circuits. Note: Any line without further designation indicates a 2-wire system. For a greater number of wires designate with numerals in manner similar to -·-·- 12-No. 18W-3/4"C., or designate by number corresponding to listing in Schedule.

$\square_{a,b,c}$ Special Auxiliary Outlets. Subscript letters refer to notes on plans or detailed description in specifications.

GRAPHICAL SYMBOLS FOR POWER AND CONTROL

ARRESTERS

General Carbon block



Electrolytic

BATTERIES

Single Cell Multiple Cell

CIRCUIT BREAKERS

General Oil or other type

Motor-operated

CAPACITORS

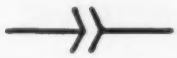
General Variable

COILS

Operating Blowout

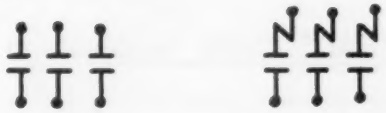
CONTACTS

Normally Open Normally Closed



Mating Connectors

CONTACTORS

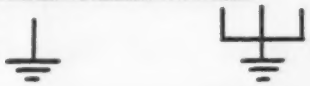


3-pole 3-pole with blowout coils

FUSES

General

GROUND CONNECTION



Single Conductor Several Conductors

INDUCTORS

or

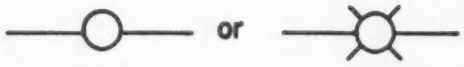
General Magnetic Core

Variable

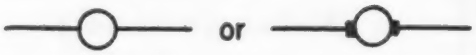
GRAPHICAL SYMBOLS FOR POWER AND CONTROL

(continued)

LAMPS



MACHINES, ROTATING



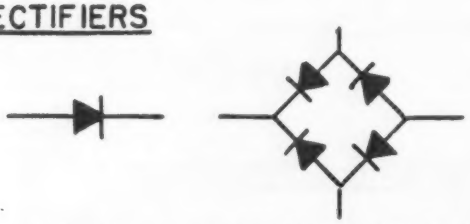
Motors, Generators, etc.

POTHEADS (Cable Terminators)

Single Conductor

Several Conductors

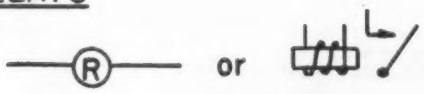
RECTIFIERS



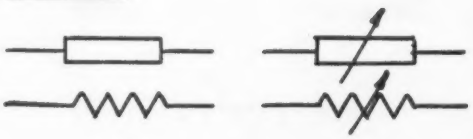
Half Wave

Full Wave (Bridge)

RELAYS



RESISTORS



Fixed

Variable

SWITCHES

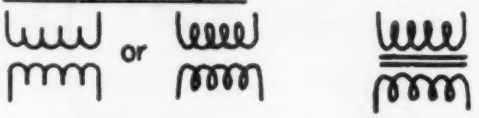
Single Throw

Double Throw

Knife

Pushbutton

TRANSFORMERS



General

With Core

WIRING

Conductors

Spliced Conductors

Crossing of conductors, not connected

Crossing of conductors, connected

Joining of conductors, not crossing

Grouping of conductors

Table 1. Maximum Number of Conductors in Conduit or Tubing

Types RF-2, RFH-2, R, RH, RW, RH-RW, RHW, RHH, RU, RUH, RUW, SF and SFF Types TF, T, TW and THW

Size AWG or MCM	Maximum Number of Conductors in Conduit or Tubing (Based upon % conductor fill, Table 3, Ch. 10, for new work)											
	½ In.	¾ In.	1 In.	1¼ In.	1½ In.	2 In.	2½ In.	3 In.	3½ In.	4 In.	5 In.	6 In.
18	7	12	20	35	49	80	115	176				
16	6	10	17	30	41	68	98	150				
14	4	6	10	18	25	41	58	90	121	155		
12	3	5	8	15	21	34	50	76	103	132	208	
10	1	4	7	13	17	29	41	64	86	110	173	
8	1	3	4	7	10	17	25	38	52	67	105	152
6	1	1	3	4	6	10	15	23	32	41	64	93
4	1	1	1	3	5	8	12	18	24	31	49	72
3		1	1	3	4	7	10	16	21	28	44	63
2		1	1	3	3	6	9	14	19	24	38	55
1		1	1	1	3	4	7	10	14	18	29	42
0			1	1	2	4	6	9	12	16	25	37
00			1	1	1	3	5	8	11	14	22	32
000			1	1	1	3	4	7	9	12	19	27
0000				1	1	2	3	6	8	10	16	23
250				1	1	1	3	5	6	8	13	19
300				1	1	1	3	4	5	7	11	16
350				1	1	1	1	3	5	6	10	15
400					1	1	1	3	4	6	9	13
500					1	1	1	3	4	5	8	11
600						1	1	1	3	4	6	9
700						1	1	1	3	3	6	8
750						1	1	1	3	3	5	8
800						1	1	1	2	3	5	7
900						1	1	1	1	3	4	7
1000						1	1	1	1	3	4	6
1250							1	1	1	1	3	5
1500								1	1	1	3	4
1750								1	1	1	2	4
2000								1	1	1	1	3

Table 3: Combination of Conductors

For groups or combinations of conductors not included in Table 1, it is recommended that the conduit or tubing be of such size that the sum of the cross-sectional areas of the individual conductors will not be more than the percentage of the interior cross-sectional area of the conduit or tubing shown in the following table:

Per Cent Area of Conduit or Tubing

	Number of Conductors				
	1	2	3	4	Over 4
Conductors (not lead covered)	53	31	43	40	40
Lead-covered conductors . . .	55	30	40	38	35
For rewiring existing raceways for increased load where it is impracticable to increase the size of the raceway due to structural conditions.	60	40	50	50	50

See Note to Table 5 for size of conduit or tubing for combinations of conductors not shown in Table 1.

Full Load Currents (Amperes) Table 430-147: DC Motors

HP	115V	230V	550V
⅛	3.	1.5	..
¼	3.8	1.9	..
⅓	5.4	2.7	..
½	7.4	3.7	1.6
1	9.6	4.8	2.0
1½	13.2	6.6	2.7
2	17	8.5	3.6
3	25	12.5	5.2
5	40	20	8.3
7½	58	29	12
10	76	38	16
15	112	56	23
20	148	74	31
25	184	92	38
30	220	110	46
40	292	146	61
50	360	180	75
60	430	215	90
75	536	268	111
100		355	148
125		443	184
150		534	220
200		712	295

These values of full-load currents are for motors running at usual speed.

Table 430-148: 1-Phase AC Motors

HP	115V	230V	440V
⅙	4.4	2.2	..
⅓	5.8	2.9	..
½	7.2	3.6	..
½	9.8	4.9	..
¾	13.8	6.9	..
1	16	8	..
1½	20	10	..
2	24	12	..
3	34	17	..
5	56	28	..
7½	80	40	21
10	100	50	26

These values of full-load currents are for motors running at usual speeds and motors with normal torque characteristics. Motors built for especially low speeds or high torques may have higher full-load currents, in which case the nameplate current ratings should be used.

To obtain full-load currents of 208 and 200-volt motors, increase corresponding 230-volt motor full-load currents by 10 and 15 per cent, respectively.

Table 430-150: 3-Phase AC Motors

	Induction Type Squirrel-Cage and Wound Rotor Amperes					Synchronous Type †Unity Power Factor Amperes			
HP	110V	220V	440V	550V	2300V	220V	440V	550V	2300V
½	4	2	1	.8					
¾	5.6	2.8	1.4	1.1					
1	7	3.5	1.8	1.4					
1½	10	5	2.5	2.0					
2	13	6.5	3.3	2.6					
3		9	4.5	4					
5		15	7.5	6					
7½		22	11	9					
10		27	14	11					
15		40	20	16					
20		52	26	21					
25		64	32	26	7	54	27	22	5.4
30		78	39	31	8.5	65	33	26	6.5
40		104	52	41	10.5	86	43	35	8
50		125	63	50	13	108	54	44	10
60		150	75	60	16	128	64	51	12
75		185	93	74	19	161	81	65	15
100		246	123	98	25	211	106	85	20
125		310	155	124	31	264	132	106	25
150		360	180	144	37		158	127	30
200		480	240	192	48		210	168	40

For full-load currents of 208 and 200-volt motors, increase the corresponding 220-volt motor full-load current by 6 and 10 per cent, respectively.

These values of full-load current are for motors running at speeds usual for belted motors and motors with normal torque characteristics. Motors built for especially low speeds or high torques may require more running current, in which case the nameplate current rating should be used.

†For 90 and 80 per cent P.F. the above figures should be multiplied by 1.1 and 1.25 respectively.

Table 4 – Dimensions and Per Cent Area of Conduit and of Tubing

Areas of Conduit or Tubing for the Combinations of Wires Permitted in Table 3

Trade Size	Internal Diameter Inches	Area – Square Inches								
		Total 100%	Not Lead Covered				Lead Covered			
			1 Cond. 53%	2 Cond. 31%	3 Cond. 43%	4 Cond. and Over 40%	1 Cond. 55%	2 Cond. 30%	3 Cond. 40%	4 Cond. 38%	Over 4 Cond. 35%
½	.622	.30	.16	.09	.13	.12	.17	.09	.12	.11	.11
¾	.824	.53	.28	.16	.23	.21	.29	.16	.21	.20	.19
1	1.049	.86	.46	.27	.37	.34	.47	.26	.34	.33	.30
1¼	1.380	1.50	.80	.47	.65	.60	.83	.45	.60	.57	.53
1½	1.610	2.04	1.08	.63	.88	.82	1.12	.61	.82	.78	.71
2	2.067	3.36	1.78	1.04	1.44	1.34	1.85	1.01	1.34	1.28	1.18
2½	2.469	4.79	2.54	1.48	2.06	1.92	2.63	1.44	1.92	1.82	1.68
3	3.068	7.38	3.91	2.29	3.17	2.95	4.06	2.21	2.95	2.80	2.58
3½	3.548	9.90	5.25	3.07	4.26	3.96	5.44	2.97	3.96	3.76	3.47
4	4.026	12.72	6.74	3.94	5.47	5.09	7.00	3.82	5.09	4.83	4.45
5	5.047	20.00	10.60	6.20	8.60	8.00	11.00	6.00	8.00	7.60	7.00
6	6.065	28.89	15.31	8.96	12.42	11.56	15.89	8.67	11.56	10.98	10.11

Table 5 – Dimensions of Rubber-Covered and Thermoplastic-Covered Conductors

Size AWG MCM	Types RF-2, RFH-2, R, RH, RHH, RHW, RH-RW, RW THW		Types TF, T, TW, RU**, RUH**, RUW	
	Approx. Diam. Inches	Approx. Area Sq. Ins.	Approx. Diam. Inches	Approx. Area Sq. Ins.
18	.146	.0167	.106	.0088
16	.158	.0196	.118	.0109
14	2/64 in. .171	.0230	.131	.0135
14	3/64 in. .204*	.0327*		
12	2/64 in. .188	.0278	.148	.0172
12	3/64 in. .221*	.0384*		
10	.242	.0460	.168	.0224
8	.311	.0760	.228	.0408
6	.397	.1238	.323	.0819
4	.452	.1605	.372	.1087
3	.481	.1817	.401	.1263
2	.513	.2067	.433	.1473
1	.588	.2715	.508	.2027
0	.629	.3107	.549	.2367
00	.675	.3578	.595	.2781
000	.727	.4151	.647	.3288
0000	.785	.4840	.705	.3904
250	.868	.5917	.788	.4877
300	.933	.6837	.843	.5581
350	.985	.7620	.895	.6291
400	1.032	.8365	.942	.6969
500	1.119	.9834	1.029	.8316
600	1.233	1.1940	1.143	1.0261
700	1.304	1.3355	1.214	1.1575
750	1.339	1.4082	1.249	1.2252
800	1.372	1.4784	1.282	1.2908
900	1.435	1.6173	1.345	1.4208
1000	1.494	1.7531	1.404	1.5482
1250	1.676	2.2062	1.577	1.9532
1500	1.801	2.5475	1.702	2.2748
1750	1.916	2.8895	1.817	2.5930
2000	2.021	3.2079	1.922	2.9013

*The dimensions of Type RW, RHH and THW wire. Also, these dimensions to be used for new work in computing size of conduit or tubing for combinations of wires not shown in Table 1.

** No. 14 to No. 2.

No. 18 to No. 8, solid; No. 6 and larger, stranded.

The dimensions of rubber-covered conductors in column 3 of this table are to be used in computing the size of conduit or tubing for new work for combinations not shown in Table 1. The dimensions in the last column of this table may be used only for rewiring existing raceways.

Table 6 – Dimensions of Lead-Covered Conductors

Types RL, RHL, and RUL

Size AWG MCM	Single Conductor		Two Conductor		Three Conductor	
	Diam. Inches	Area Sq. Ins.	Diam. Inches	Area Sq. Ins.	Diam. Inches	Area Sq. Ins.
14	.28	.062	.28 x .47	.115	.59	.273
12	.29	.066	.31 x .54	.146	.62	.301
10	.35	.096	.35 x .59	.180	.68	.363
8	.41	.132	.41 x .71	.255	.82	.528
6	.49	.188	.49 x .86	.369	.97	.738
4	.55	.237	.54 x .96	.457	1.08	.916
2	.60	.283	.61 x 1.08	.578	1.21	1.146
1	.67	.352	.70 x 1.23	.756	1.38	1.49
0	.71	.396	.74 x 1.32	.859	1.47	1.70
00	.76	.454	.79 x 1.41	.980	1.57	1.94
000	.81	.515	.84 x 1.52	1.123	1.69	2.24
0000	.87	.593	.90 x 1.64	1.302	1.85	2.68
250	.98	.754	. . . . .		2.02	3.20
300	1.04	.85	. . . . .		2.15	3.62
350	1.10	.95	. . . . .		2.26	4.02
400	1.14	1.02	. . . . .		2.40	4.52
500	1.23	1.18	. . . . .		2.59	5.28

Note – No. 14 to No. 8, solid conductors; No. 6 and larger, stranded conductors. Data for 2/64-inch insulation not yet compiled.

Varnished-Cambric Insulated Conductors

Type V

The insulation thickness for varnished-cambric conductors, Type V, is the same as for rubber-covered conductors, Type R, except for Nos. 14 and 12 which have 3/64-inch insulation for varnished-cambric, and 2/64-inch insulation for rubber-covered conductors and for No. 8 which has 3/64-inch insulation for varnished-cambric, and 4/64-inch insulation for rubber-covered conductors. Tables 1 and 2 may, therefore, be used for the number of varnished-cambric insulated conductors in a conduit or tubing.

Note: The above tables give the nominal size of conductors and conduit or tubing recommended for use in computing size of conduit or tubing for various combinations of conductors. The dimensions represent average conditions only, and while variations will be found in dimensions of conductors and conduits of different manufacture, these variations will not affect the computation.

Table 430-152. Maximum Rating or Setting of Motor-Branch-Circuit Protective Devices for Motors Marked with a Code Letter Indicating Locked Rotor KVA

Type of Motor	Per Cent of Full-Load Current		
	Fuse Rating See also Table 430-146, Columns 4, 5, 6, 7)	Circuit-Breaker Setting Instantaneous Type	Time Limit Type
All AC single-phase and polyphase squirrel cage and synchronous motors with full-voltage, resistor or reactor starting:			
Code Letter A	150	.....	150
Code Letter B to E	250	.....	200
Code Letter F to V	300	.....	250
All AC squirrel cage and synchronous motors with autotransformer starting:			
Code Letter A	150	.....	150
Code Letter B to E	200	.....	200
Code Letter F to V	250	.....	200

Synchronous motors of the low-torque, low-speed type (usually 450 RPM or lower), such as are used to drive reciprocating compressors, pumps, etc., which start up unloaded, do not require a fuse rating or circuit-breaker settingin excess of 200 per cent of full-load current.

Table 430-153. Maximum Rating or Setting of Motor-Branch-Circuit Protective Devices for Motors not Marked with a Code Letter Indicating Locked Rotor KVA

Type of Motor	Per Cent of Full-Load Current		
	Fuse Rating (See also Table 430-146, Columns 4, 5, 6, 7	Circuit-Breaker Setting Instantaneous Type	Time Limit Type
1-phase, all types	300	.....	250
Squirrel-cage and synchronous (full-voltage, resistor and reactor starting)	300	.....	250
Squirrel-cage and synchronous (autotransformer starting) Not more than 30 amperes	250	.....	200
More than 30 amperes	200	.....	200
High-reactance squirrel-cage Not more than 30 amperes	250	.....	250
More than 30 amperes	200	.....	200
Wound-rotor	150	.....	150
Direct-current Not more than 50 H.P.	150	250	150
More than 50 H.P.	150	175	150

Table 430-7(b). Locked Rotor Indicating Code Letters

Code Letter	Kilovolt-Amperes per Horsepower with Locked Rotor
A	0 — 3.14
B	3.15 — 3.54
C	3.55 — 3.99
D	4.0 — 4.49
E	4.5 — 4.99
F	5.0 — 5.59
G	5.6 — 6.29
H	6.3 — 7.09
J	7.1 — 7.99
K	8.0 — 8.99
L	9.0 — 9.99
M	10.0 — 11.19
N	11.2 — 12.49
P	12.5 — 13.99
R	14.0 — 15.99
S	16.0 — 17.99
T	18.0 — 19.99
U	20.0 — 22.39
V	22.4 — and up

The above table is an adopted standard of the National Electrical Manufacturers Association.

The code letter indicating motor input with locked rotor must be in an individual block on the nameplate, properly designated. This code letter is to be used for determining branch circuit overcurrent protection by reference to Table 430-152.

Table 710-37: Isolation by Elevation

Distance of Live Parts Above the Floor or Other Working Surface

Voltage Between Phases	Minimum Vertical Clearance of Unguarded Parts Feet	Inches
601	8	0
2300	8	0
6600	8	0
11000	9	0
22000	9	3
33000	9	6
44000	9	10
66000	10	5
88000	11	0
110000	11	7
132000	12	2

Table 710-38: Working Space

Minimum Clear Space Adjacent to Live Parts

Voltage Between Phases	Minimum Horizontal Clearance of Unguarded Parts Feet	Inches
601	3	2
2300	3	3
6600	3	4
11000	3	6
22000	3	9
33000	4	0
44000	4	4
66000	4	11
88000	5	6
110000	6	1
132000	6	8

MAXIMUM NUMBER OF CONDUCTORS IN BOXES

Table 370-6(a-1): Deep Boxes

Box Dimensions Trade Size	Maximum Number of Conductors No. 14	No. 12	No. 10	No. 8
1 1/2 x 3 1/4 octagonal	5	5	4	0
1 1/2 x 4 octagonal	8	7	6	5
1 1/4 x 4 square	9	7	6	4
1 1/2 x 4 square	11	9	7	5
1 1/2 x 4 11/16 square	16	12	10	8
2 1/8 x 4 11/16 square	20	16	12	10
2 x 1 3/4 x 2 3/4	5	4	4	
2 1/2 x 1 3/4 x 2 3/4	6	6	5	
3 x 1 3/4 x 2 3/4	7	7	6	

Where there is not sufficient space for a deeper box, four No. 14 AWG conductors may enter a box provided with cable clamps and containing one or more devices on a single mounting strap.

Table 370-6(a-2): Shallow Boxes (Less than 1½" Depth)

Box Dimensions Trade Size	Maximum Number of Conductors No. 14	No. 12	No. 10
3 1/4	4	4	3
4	6	6	4
4 11/16	8	6	6

The above tables apply where no fittings or devices, such as fixture studs, cable clamps, hickeys, switches or receptacles are contained in the box. Where one or more fixture studs, cable clamps, or hickeys are contained in the box, the number of conductors shall be one less than shown in the tables with a further deduction of one conductor for one or several flush devices mounted on the same strap. A conductor running through the box is counted as one conductor and each conductor originating outside the box and terminating inside the box is counted as one conductor. Conductors of which no part leaves the box are not to be counted in the above computation. If single flush boxes are ganged, and each section is occupied by a flush device or combination of flush devices on the same strap, the limitations will apply to each section individually.

Table 370-6(b): Other Combinations

Size of Conductor	Free Space Within Box for Each Conductor
No. 14	2. cubic inches
No. 12	2.25 cubic inches
No. 10	2.5 cubic inches
No. 8	3. cubic inches

PROTECTIVE DEVICES FOR RUNNING OVERLOAD PROTECTION AND BRANCH CIRCUIT PROTECTION

(Based on Rated Full-load Motor Current)
Table 430–146

Col. No. 1	2	3	4		5		6		7	
			Maximum Allowable Rating or Setting of Branch Circuit Protective Devices							
	For Running Protection of Motors		WITH CODE LETTERS Single-phase squirrel cage and synchronous. Full voltage, resistor or reactor starting, Code letters F to V inclusive.		WITH CODE LETTERS Single-phase, squirrel cage and synchronous. Full voltage, resistor or reactor start, Code letters B to E inclusive. Auto transformer start, Code letters F to V inclusive.		WITH CODE LETTERS Squirrel cage and synchronous auto transformer start, Code letters B to E inclusive.		WITH CODE LETTERS All motors code letter A.	
Full load current rating of motor amperes	Maximum rating of non-adjustable protective devices.	Maximum setting of adjustable protective devices.	WITHOUT CODE LETTERS Same as above.		WITHOUT CODE LETTERS (Not more than 30 Amperes) Squirrel cage and synchronous, auto transformer start, high reactance squirrel cage.		WITHOUT CODE LETTERS (More than 30 Amperes) Squirrel cage and synchronous, auto transformer start, high reactance squirrel cage.		WITHOUT CODE LETTERS DC and wound rotor motors.	
	Amperes	Amperes	Fuses	Circuit Breakers (Non-adjustable Overload Trip)	Fuses	Circuit Breakers (Non-adjustable Overload Trip)	Fuses	Circuit Breakers (Non-adjustable Overload Trip)	Fuses	Circuit Breakers (Non-adjustable Overload Trip)
1	2	1.25	15	15	15	15	15	15	15	15
2	3	2.50	15	15	15	15	15	15	15	15
3	4	3.75	15	15	15	15	15	15	15	15
4	6	5.0	15	15	15	15	15	15	15	15
5	8	6.25	15	15	15	15	15	15	15	15
6	8	7.50	20	15	15	15	15	15	15	15
7	10	8.75	25	20	20	15	15	15	15	15
8	10	10.0	25	20	20	20	20	20	15	15
9	12	11.25	30	30	25	20	20	20	15	15
10	15	12.50	30	30	25	20	20	20	15	15
11	15	13.75	35	30	30	30	25	30	20	20
12	15	15.00	40	30	30	30	25	30	20	20
13	20	16.25	40	40	35	30	30	30	20	20
14	20	17.50	45	40	35	30	30	30	25	30
15	20	18.75	45	40	40	30	30	30	25	30
16	20	20.00	50	40	40	40	35	40	25	30
17	25	21.25	60	50	45	40	35	40	30	30
18	25	22.50	60	50	45	40	40	40	30	30
19	25	23.75	60	50	50	40	40	40	30	30
20	25	25.00	60	50	50	40	40	40	30	30
22	30	27.50	70	70	60	50	45	50	35	40
24	30	30.00	80	70	60	50	50	50	40	40
26	35	32.50	80	70	70	70	60	70	40	40
28	35	35.00	90	70	70	70	60	70	45	50
30	40	37.50	90	100	80	70	60	70	45	50
32	40	40.00	100	100	80	70	70	70	50	50
34	45	42.50	110	100	90	70	70	70	60	70
36	45	45.00	110	100	90	100	80	100	60	70
38	50	47.50	125	100	100	100	80	100	60	70
40	50	50.00	125	100	100	100	80	100	60	70
42	50	52.50	125	125	110	100	90	100	70	70
44	60	55.00	125	125	110	100	90	100	70	70
46	60	57.50	150	125	125	100	100	100	70	70
48	60	60.00	150	125	125	100	100	100	80	100
50	60	62.50	150	125	125	100	100	100	80	100
52	70	65.00	175	150	150	125	110	125	80	100
54	70	67.50	175	150	150	125	110	125	90	100
56	70	70.00	175	150	150	125	125	125	90	100
58	70	72.50	175	150	150	125	125	125	90	100
60	80	75.00	200	150	150	125	125	125	90	100
62	80	77.50	200	175	175	125	125	125	100	100
64	80	80.00	200	175	175	150	150	150	100	100
66	80	82.50	200	175	175	150	150	150	100	100
68	90	85.00	225	175	175	150	150	150	110	125
70	90	87.50	225	175	175	150	150	150	110	125
72	90	90.00	225	200	200	150	150	150	110	125
74	90	92.50	225	200	200	150	150	150	125	125
76	100	95.00	250	200	200	175	175	175	125	125
78	100	97.50	250	200	200	175	175	175	125	125
80	100	100.00	250	200	200	175	175	175	125	125
82	110	102.50	250	225	225	175	175	175	125	125
84	110	105.00	250	225	225	175	175	175	150	150
86	110	107.50	300	225	225	175	175	175	150	150
88	110	110.00	300	225	225	200	200	200	150	150
90	110	112.50	300	225	225	200	200	200	150	150
92	125	115.00	300	250	250	200	200	200	150	150
94	125	117.50	300	250	250	200	200	200	150	150
96	125	120.00	300	250	250	200	200	200	150	150
98	125	122.50	300	250	250	200	200	200	150	150
100	125	125.00	300	250	250	200	200	200	150	150
105	150	131.50	350	300	300	225	225	225	175	175
110	150	137.50	350	300	300	225	225	225	175	175
115	150	144.00	350	300	300	250	250	250	175	175
120	150	150.00	400	300	300	250	250	250	200	200
125	175	156.50	400	350	350	250	250	250	200	200
130	175	162.50	400	350	350	300	300	300	200	200
135	175	169.00	450	350	350	300	300	300	225	225
140	175	175.00	450	350	350	300	300	300	225	225
145	200	181.50	450	400	400	300	300	300	225	225
150	200	187.50	450	400	400	300	300	300	225	225
155	200	194.00	500	400	400	350	350	350	250	250
160	200	200.00	500	400	400	350	350	350	250	250
165	225	206.00	500	500	450	350	350	350	250	250
170	225	213.00	500	500	450	350	350	350	300	300
175	225	219.00	600	500	450	350	350	350	300	300
180	225	225.00	600	500	450	400	400	400	300	300
185	250	231.00	600	500	500	400	400	400	300	300
190	250	238.00	600	500	500	400	400	400	300	300
195	250	244.00	600	500	500	400	400	400	300	300
200	250	250.00	600	500	500	400	400	400	300	300
210	250	263.00	800	600	600	500	450	500	350	350
220	300	275.00	800	600	600	500	450	500	350	350
230	300	288.00	800	600	600	500	500	500	350	350
240	300	300.00	800	600	600	500	500	500	400	400
250	300	313.00	800	700	800	500	500	500	400	400
260	350	325.00	800	700	800	600	600	600	400	400
270	350	338.00	1000	700	800	600	600	600	450	500
280	350	350.00	1000	700	800	600	600	600	450	500

ALLOWABLE CURRENT-CARRYING CAPACITIES OF INSULATED CONDUCTORS (Amperes)

Not More Than Three Conductors in Raceway or Cable or Direct Burial
(Based on Room Temperature of 30C, 86F)

TABLE 310-12: COPPER

Size AWG MCM	Rubber Type R Type RW Type RU Type RUW (14-2) Type RH-RW* Thermo-plastic Type T Type TW	Rubber Type RH RUH (14-2) Type RH-RW* Type RHW Thermo-plastic Type THW	Paper Thermo-plastic Asbestos Type TA Var-Cam Type V Asbestos Var-Cam Type AVB MI Cable RHH† SA	Asbestos Var-Cam Type AVA Type AVL	Impreg-nated Asbestos Type AI (14-8) Type AIA	Asbestos Type A (14-8) Type AA
14	15	15	25	30	30	30
12	20	20	30	35	40	40
10	30	30	40	45	50	55
8	40	45	50	60	65	70
6	55	65	70	80	85	95
4	70	85	90	105	115	120
3	80	100	105	120	130	145
2	95	115	120	135	145	165
1	110	130	140	160	170	190
0	125	150	155	190	200	225
00	145	175	185	215	230	250
000	165	200	210	245	265	285
0000	195	230	235	275	310	340
250	215	255	270	315	335	.....
300	240	285	300	345	380	.....
350	260	310	325	390	420	.....
400	280	335	360	420	450	.....
500	320	380	405	470	500	.....
600	355	420	455	525	545	.....
700	385	460	490	560	600	.....
750	400	475	500	580	620	.....
800	410	490	515	600	640	.....
900	435	520	555	.....	.....	.....
1000	455	545	585	680	730	.....
1250	495	590	645	.....	.....	.....
1500	520	625	700	785	.....	.....
1750	545	650	735	.....	.....	.....
2000	560	665	775	840	.....	.....

CORRECTION FACTORS, ROOM TEMPS. OVER 30° C. 86° F.

C.	F.						
40	104	.82	.88	.90	.94	.95	.....
45	113	.71	.82	.85	.90	.92	.....
50	122	.58	.75	.80	.87	.89	.....
55	131	.41	.67	.74	.83	.86	.....
60	140	.....	.58	.67	.79	.83	.91
70	158	.....	.35	.52	.71	.76	.87
75	167	.....	.....	.43	.66	.72	.86
80	176	.....	.....	.30	.61	.69	.84
90	194	.....	.....	.....	.50	.61	.80
100	212	.....	.....	.....	.....	.51	.77
120	248	.....	.....	.....	.....	.....	.69
140	284	.....	.....	.....	.....	.....	.59

†The current-carrying capacities for Type RHH conductors for sizes AWG 14, 12 and 10 shall be the same as designated for Type RH conductors in this table.
*See Note 8a.

TABLE 310-14: ALUMINUM

Size AWG MCM	Rubber Type R, RW, RU, RUW (12-2) Type RH-RW** Thermo-plastic Type T, TW	Rubber Type RH RUH (14-2) Type RH-RW** Type RHW Thermo-plastic Type THW	Thermo-plastic Asbestos Type TA Var-Cam Type V Asbestos Var-Cam Type AVB MI Cable RHH† SA	Asbestos Var-Cam Type AVA Type AVL	Impreg-nated Asbestos Type AI (14-8) Type AIA	Asbestos Type A (14-8) Type AA
12	15	15	25	25	30	30
10	25	25	30	35	40	45
8	30	40	40	45	50	55
6	40	50	55	60	65	75
4	55	65	70	80	90	95
3	65	75	80	95	100	115
*2	75	90	95	105	115	130
*1	85	100	110	125	135	150
*0	100	120	125	150	160	180
*00	115	135	145	170	180	200
*000	130	155	165	195	210	225
*0000	155	180	185	215	245	270
250	170	205	215	250	270	.....
300	190	230	240	275	305	.....
350	210	250	260	310	335	.....
400	225	270	290	335	360	.....
500	260	310	330	380	405	.....
600	285	340	370	425	440	.....
700	310	375	395	455	485	.....
750	320	385	405	470	500	.....
800	330	395	415	485	520	.....
900	355	425	455	.....	.....	.....
1000	375	445	480	560	600	.....
1250	405	485	530	.....	.....	.....
1500	435	520	580	650	.....	.....
1750	455	545	615	.....	.....	.....
2000	470	560	650	705	.....	.....

CORRECTION FACTORS, ROOM TEMPS. OVER 30° C. 86° F.

C.	F.						
40	104	.82	.88	.90	.94	.95	.....
45	113	.71	.82	.85	.90	.92	.....
50	122	.58	.75	.80	.87	.89	.....
55	131	.41	.67	.74	.83	.86	
60	140	.....	.58	.67	.79	.83	.91
70	158	.....	.35	.52	.71	.76	.87
75	167	.....	.....	.43	.66	.72	.86
80	176	.....	.....	.30	.61	.69	.84
90	194	.....	.....	.....	.50	.61	.80
100	212	.....	.....	.....	.....	.51	.77
120	248	.....	.....	.....	.....	.....	.69
140	284	.....	.....	.....	.....	.....	.59

*For three wire, single phase service and sub-service circuits, the allowable current-carrying capacity of RH, Rh-RW, Rhh and RHW aluminum conductors shall be for sizes #2-100 Amp., #1-110 Amp., #1/0-125 Amp., #2/0-150 Amp., #3/0-170 Amp. and #4/0-200 Amp.
†The current-carrying capacities for Type RHH conductors for sizes AWG 12, 10 and 8 shall be the same as designated for Type RH conductors in this table.
**See Note 8a.

NOTES TO TABLES

4. Bare Conductors. Where bare conductors are used with insulated conductors, their allowable current-carrying capacity shall be limited to that permitted for the insulated conductors of the same size.

5. Type MI Cable. The temperature limitation on which the current carrying capacities of Type MI cable are based, is determined by the insulating materials used in the end seal. Termination fittings incorporating unimpregnated organic insulating materials are limited to 85° C. operation.

7. Use of Conductors With Higher Operating Temperatures. Where the room temperature is within 10 degrees C of the maximum allowable operating temperature of the insulation, it is desirable to use an insulation with a higher maximum allowable operating temperature; although insulation can be used in a room temperature approaching its maximum allowable operating temperature limit if the current is reduced in accordance with the Correction Factors for different room temperatures.

8. More Than Three Conductors in a Raceway. Tables 310-12 and 310-14 give the allowable current-carrying capacities for not more than three conductors in a raceway or cable. Where the number of conductors in a raceway or cable exceeds three, the allowable current-carrying capacity of each conductor shall be reduced as shown in the following Table:

Number of Conductors	Per Cent of Tabular Values
4 to 6	80
7 to 24	70
25 to 42	60
43 and above	50

Exception—When conductors of different systems, as provided in Section 300-3, are installed in a common raceway the derating factors shown above apply to the number of Power and Lighting (Articles 210, 220 and 230) conductors only.

8. (a) Where Type RH-RW rubber insulated wire is used in wet locations the allowable current carrying capacities shall be that of Column 2 in Tables 310-12 through 310-15. Where used in dry locations the allowable current carrying capacities shall be that of Column 3 in Tables 310-12 through 310-15.

9. Overcurrent Protection. Where the standard ratings and settings of overcurrent devices do not correspond with the ratings and settings allowed for conductors, the next higher standard rating and setting may be used.

10. Neutral Conductor. A neutral conductor which carries only the unbalanced current from other conductors, as in the case of normally balanced circuits of three or more conductors, shall not be counted in determining current-carrying capacities as provided for in Paragraph 8 of these notes.

In a 3-wire circuit consisting of two phase wires and the neutral of a 4-wire, 3-phase system, a common conductor carries approximately the same current as the other conductors and is not therefore considered as a neutral conductor.

11. Voltage Drop. The allowable current-carrying capacities in Tables 310-12 through 310-15 are based on temperature alone and do not take voltage drop into consideration.

12. Deterioration of Insulation. It should be noted that even the best grades of rubber insulation will deteriorate in time, so eventually will need to be replaced.

DC CIRCUIT CHARACTERISTICS

Ohm's Law:

$$E = IR \qquad I = \frac{E}{R} \qquad R = \frac{E}{I}$$

E = voltage impressed on circuit (volts)
I = current flowing in circuit (amperes)
R = circuit resistance (ohms)

In direct current circuits, electrical power is equal to the product of the voltage and current:

$$P = EI = I^2R = \frac{E^2}{R}$$

P = power (watts)
E = voltage (volts)
I = current (amperes)
R = resistance (ohms)

AC CIRCUIT CHARACTERISTICS

The instantaneous values of an alternating current or voltage vary from zero to a maximum value each half cycle. In the practical formulae which follow, the "effective value" of current and voltage is used, defined as follows:

Effective value = 0.707 × maximum instantaneous value

Impedance:

Impedance is the total opposition to the flow of alternating current. It is a function of resistance, capacitive reactance and inductive reactance. The following formulae relate these circuit properties:

$$X_L = 2\pi fL \qquad X_C = \frac{1}{2\pi fC} \qquad Z = \sqrt{R^2 + (X_L - X_C)^2}$$

X_L = inductive reactance (ohms)
X_C = capacitive reactance (ohms)
Z = impedance (ohms)
f = frequency (cyles per second)
C = capacitance (farads)
L = inductance (henrys)
R = resistance (ohms)
$\pi = 3.14$

Ohm's Law for AC Circuits:

$$E = I \times Z \qquad I = \frac{E}{Z} \qquad Z = \frac{E}{I}$$

POWER FACTOR

Power factor of a circuit or system is the ratio of actual power (watts) to apparent power (volt-amperes), and is equal to the cosine of the phase angle of the circuit:

$$PF = \frac{\text{actual power}}{\text{apparent power}} = \frac{\text{watts}}{\text{volts} \times \text{amperes}} = \frac{KW}{KVA} = \frac{R}{Z}$$

KW = kilowatts
KVA = kilovolt-amperes = volt-amperes × 1,000
PF = power factor (expressed as decimal)

SINGLE-PHASE CIRCUITS

$$KVA = \frac{EI}{1{,}000} = \frac{KW}{PF} \qquad KW = KVA \times PF$$

$$I = \frac{P}{E \times PF} \qquad E = \frac{P}{I \times PF} \qquad PF = \frac{P}{E \times I}$$

$P = E \times I \times PF$
P = power (watts)

THREE-PHASE CIRCUITS, BALANCED STAR OR WYE

$$I_N = 0 \qquad I = I_p \qquad E = \sqrt{3}\,E_p = 1.73\,E_p$$

$$E_p = \frac{E}{\sqrt{3}} = \frac{E}{1.73} = 0.577E$$

I_N = current in neutral (amperes)
I = line current per phase (amperes)
I_p = current in each phase winding (amperes)
E = voltage, phase to phase (volts)
E_p = voltage, phase to neutral (volts)

THREE-PHASE CIRCUITS, BALANCED DELTA

$$I = 1.732 \times I_p \qquad I_p = \frac{I}{\sqrt{3}} = 0.577 \times I$$

$E = E_p$

POWER: BALANCED 3-WIRE, 3-PHASE CIRCUIT, DELTA OR WYE

For unity power factor (PF = 1.0):

$$P = 1.732 \times E \times I$$

$$I = \frac{P}{\sqrt{3}\,E} = \frac{0.577P}{E} \qquad E = \frac{P}{\sqrt{3} \times I} = \frac{0.577P}{I}$$

P = total power (watts)

For any load:

$$P = 1.732 \times E \times I \times PF \qquad VA = 1.732 \times E \times I$$

$$E = \frac{P}{PF \times 1.73 \times I} = \frac{0.577 \times P}{PF \times I}$$

$$I = \frac{P}{PF \times 1.73 \times E} = \frac{0.577 \times P}{PF \times E}$$

$$PF = \frac{P}{1.73 \times I \times E} = \frac{0.577 \times P}{I \times E}$$

VA = apparent power (volt-amperes)
P = actual power (watts)
E = line voltage (volts) phase to phase
I = line current (amperes)

POWER LOSS: ANY AC OR DC CIRCUIT

$$P = I^2R \qquad I = \sqrt{\frac{P}{R}} \qquad R = \frac{P}{I^2}$$

P = power heat loss in circuit (watts)
I = effective current in conductor (amperes)
R = conductor resistance (ohms)

CONVERSION TABLES

KILOWATTS TO HORSEPOWER

kw	hp	kw	hp	kw	hp
1	1.341	30	40.218	130	174.28
2	2.681	32	42.899	140	187.68
3	4.022	34	45.580	150	201.09
4	5.363	36	48.261	160	214.50
5	6.703	38	50.943	170	227.90
6	8.044	40	53.624	180	241.31
7	9.384	42	56.305	190	254.71
8	10.725	44	58.986	200	268.12
9	12.065	46	61.667	220	294.93
10	13.406	48	64.349	240	321.74
11	14.747	50	67.030	260	348.56
12	16.087	55	73.733	280	375.37
13	17.428	60	80.436	300	402.18
14	17.768	65	87.139	325	435.69
15	20.109	70	93.842	350	469.21
16	21.450	75	100.545	400	436.24
17	22.790	80	107.248	450	603.27
18	24.131	85	113.951	500	670.30
19	25.471	90	120.654	600	804.36
20	26.812	95	127.357	700	938.42
22	29.493	100	134.048	800	1072.48
24	32.174	110	147.47	900	1206.54
26	34.856	120	160.87	1000	1340.60
28	37.537				

HORSEPOWER TO KILOWATTS

hp	kw	hp	kw	hp	kw
1	.746	30	22.380	130	96.98
2	1.492	32	23.872	140	104.44
3	2.238	34	25.364	150	111.90
4	2.984	36	26.856	160	119.36
5	3.730	38	28.348	170	126.82
6	4.476	40	29.840	180	134.28
7	5.222	42	21.332	190	141.74
8	5.968	44	32.824	200	149.20
9	6.714	46	34.316	220	164.12
10	7.460	48	35.808	240	179.04
11	8.206	50	37.300	260	193.96
12	8.952	55	41.03	280	208.88
13	9.698	60	44.76	300	223.80
14	10.444	65	48.49	325	242.45
15	11.190	70	52.22	350	261.1
16	11.936	75	55.95	400	298.4
17	12.682	80	59.68	450	335.7
18	13.428	85	63.41	500	373.0
19	14.174	90	67.14	600	447.6
20	14.920	95	70.87	700	522.2
22	16.412	100	74.60	800	596.8
24	17.904	110	82.06	900	671.4
26	19.396	120	89.52	1000	746.0
28	20.888				

Note: Conversions not given may be obtained by adding appropriate given values.

DECIMAL EQUIVALENTS

Fraction	Decimal	Fraction	Decimal
1/64	0.015625	33/64	0.515625
1/32	0.031250	17/32	0.531250
3/64	0.046875	35/64	0.546875
1/16	0.062500	9/16	0.562500
5/64	0.078125	37/64	0.578125
3/32	0.093750	19/32	0.593750
7/64	0.109375	39/64	0.609375
1/8	0.125000	5/8	0.625000
9/64	0.140625	41/64	0.640625
5/32	0.156250	21/32	0.656250
11/64	0.171875	43/64	0.671875
3/16	0.187500	11/16	0.687500
13/64	0.203125	45/64	0.703125
7/32	0.218750	23/32	0.718750
15/64	0.234375	47/64	0.734375
1/4	0.250000	3/4	0.750000
17/64	0.265625	49/64	0.765625
9/32	0.281250	25/32	0.781250
19/64	0.296875	51/64	0.796875
5/16	0.312500	13/16	0.812500
21/64	0.328125	53/64	0.828125
11/32	0.343750	27/32	0.843750
23/64	0.359375	55/64	0.859375
3/8	0.375000	7/8	0.875000
25/64	0.390625	57/64	0.890625
13/32	0.406250	29/32	0.906250
27/64	0.421875	59/64	0.921875
7/16	0.437500	15/16	0.937500
29/64	0.453125	61/64	0.953125
15/32	0.468750	31/32	0.968750
31/64	0.484375	63/64	0.984375
1/2	0.500000		

TEMPERATURE

Centigrade	Fahrenheit	Centigrade	Fahrenheit
−18	−0.4	52	125.6
−16	3.2	54	129.2
−14	6.8	56	132.8
−12	10.4	58	136.4
−10	14.0	60	140.0
−8	17.6	62	143.6
−6	21.2	64	147.2
−4	24.8	66	150.8
−2	28.4	68	154.4
*0	32.0	70	158.0
2	35.6	72	161.6
4	39.2	74	165.2
6	42.8	76	168.8
8	46.4	78	172.4
10	50.0	80	176.0
12	53.6	82	179.6
14	57.2	84	183.2
16	60.8	86	186.8
18	64.4	88	190.4
20	68.0	90	194.0
22	71.6	92	197.6
24	75.2	94	201.2
26	78.8	96	204.8
28	82.4	98	208.4
30	86.0	**100	212.0
32	89.6	102	215.6
34	93.2	104	219.2
36	96.8	106	222.8
38	100.4	108	226.4
40	104.0	110	230.0
42	107.6	112	233.6
44	111.2	114	237.2
46	114.8	116	240.8
48	118.4	118	244.4
50	122.0	120	248.0

*Freezing **Boiling

Conversion Method $F = \frac{9}{5}C + 32$ $C = \frac{5}{9}(F - 32)$

CONVERSION FACTORS (continued)

These units	multiplied by	equal
amperes per square cm.	6.452	amperes per sq. inch.
ampere-turns	1.257	gilberts.
ampere-turns per cm.	2.540	ampere-turns per inch.
British thermal units	778.3	foot pounds.
	$3.931X10^{-4}$	horse-power-hours.
	1055	joules.
	$2.930X10^{-4}$	kilowatt hours.
B.t.u. per min.	12.97	foot-pounds per sec.
	0.02357	horse-power.
	0.01758	kilowatts.
	17.58	watts.
B.t.u. per sq. ft. per min.	0.1221	watts per square inch.
centimeters	$3.281X10^{-2}$	feet.
	0.3937	inches.
	$6.214X10^{-6}$	miles.
	393.7	mils.
	$1.094X10^{-2}$	yards.
centimeter-dynes	$7.376X10^{-8}$	pound-feet.
centimeter-grams	$7.233X10^{-5}$	pound-feet.
centimeters per second	1.969	feet per minute.
	0.03281	feet per second.
	0.02237	miles per hour.
	$3.728X10^{-4}$	miles per minute.
cms. per sec. per sec.	0.03281	feet per sec. per sec.
circular mils	$7.854X10^{-7}$	square inches.
	0.7854	square mils.
cubic centimeters	$3.531X10^{-5}$	cubic feet.
	$6.102X10^{-2}$	cubic inches.
cubic feet	1728	cubic inches.
	0.03704	cubic yards.
	7.481	gallons.
	59.84	pints (liq.).
	29.92	quarts (liq.).
cubic feet per minute	0.1247	gallons per sec.
	62.4	pounds of water per min.
cubic inches	$5.787X10^{-4}$	cubic feet.
	$2.143X10^{-5}$	cubic yards.
	$4.329X10^{-3}$	gallons.
	$1.061X10^{5}$	mil-feet.
	0.03463	pints (liq.).
	0.01732	quarts (liq.).
cubic meters	35.31	cubic feet.
	61,023	cubic inches.
	1.308	cubic yards.
	264.2	gallons.
	2113	pints (liq.).
	1057	quarts (liq.).
cubic yards	27	cubic feet.
	202.0	gallons.
cubic yards per minute	0.45	cubic feet per second.
	3.367	gallons per second.
degrees (angle)	60	minutes.
	0.01745	radians.
	3600	seconds.
degrees per second	0.01745	radians per second.
	0.1667	revolutions per minute.
	0.002778	revolutions per second.
dynes	$2.248X10^{-6}$	pounds.
ergs	$9.480X10^{-11}$	British thermal units.
	1	dyne-centimeters.
	$7.378X10^{-8}$	foot-pounds.
	10^{-7}	joules.
ergs per second	$5.688X10^{-9}$	B.t. units per minute.
	$4.427X10^{-6}$	foot-pounds per minute.
	$7.378X10^{-8}$	foot-pounds per second.

These units	multiplied by	equal
ergs per second	$1.341X10^{-10}$	horse-power.
	10^{-10}	kilowatts.
feet of water	62.43	pounds per square foot.
	0.4335	pounds per square inch.
feet per minute	0.01667	feet per second.
	0.01136	miles per hour.
feet per second	0.5921	knots.
	0.6818	miles per hour.
	0.01136	miles per minute.
feet per second per second	0.6818	miles per hour per sec.
foot-pounds	$1.285X10^{-3}$	British thermal units.
	$1.356X10^{7}$	ergs.
	$5.050X10^{-7}$	horse-power-hours.
	1.356	joules.
	$3.766X10^{-7}$	kilowatt-hours.
foot-pounds per minute	$1.285X10^{-3}$	B.t. units per minute.
	0.01667	foot pounds per second.
	$3.030X10^{-5}$	horse-power.
	$2.260X10^{-5}$	kilowatts.
foot-pounds per second	$7.709X10^{-2}$	B.t. units per minute.
	$1.818X10^{-3}$	horse-power.
	$1.356X10^{-3}$	kilowatts.
gallons	0.1337	cubic feet.
	231	cubic inches.
gallons per minute	$2.228X10^{-3}$	cubic feet per second.
gausses	6.452	lines per square inch.
gilberts	0.7958	ampere-turns.
gilberts per centimeter	2.021	ampere-turns per inch.
grams	980.7	dynes.
	15.43	grains.
	0.03527	ounces.
	0.03215	ounces (troy).
	$2.205X10^{-3}$	pounds.
horse-power	42.40	B.t. units per min.
	33,000	foot-pounds per minute.
	550	foot-pounds per second.
	1.014	horse-power (metric).
	0.7457	kilowatts.
	745.7	watts.
horse-power (boiler)	33.520	B.t.u. per hour.
	9.804	kilowatts.
horse-power-hours	2544	British thermal units.
	$1.98X10^{6}$	foot-pounds.
	$2.684X10^{6}$	joules.
	0.7455	kilowatt-hours.
inches	$8.333X10^{-2}$	feet.
	$1.578X10^{-5}$	miles.
	10^{3}	mils.
	$2.778X10^{-2}$	yards.
inches of water	0.5781	ounces per square inch.
	5.204	pounds per square foot.
	0.0361	pounds per square inch.
joules (Int.)	$9.480X10^{-4}$	British thermal units.
	10^{7}	ergs.
	0.7378	foot-pounds.
	$2.778X10^{-4}$	watt-hours.
kilograms	980,665	dynes.
	2.205	pounds.
	$1.102X10^{-3}$	tons (short).
kilolines	10^{3}	maxwells.
kilowatts	56.88	B.t. units per min.
	$4.427X10^{4}$	foot-pounds per min.
	737.8	foot-pounds per sec.
	1.341	horse-power.
	10^{3}	watts.

CONVERSION FACTORS (continued)

These units	multiplied by	equal
kilowatt-hours	3413	British thermal units.
	$2.656X10^{6}$	foot-pounds.
	1.341	horse-power-hours.
	$3.6X10^{6}$	joules.
lines per square cm.	1	gausses.
lines per square inch	0.1550	gausses.
lumens per sq. ft.	1	foot-candles.
maxwells	10^{-3}	kilolines.
megalines	10^{6}	maxwells.
megohms	10^{6}	ohms.
meters	3.281	feet.
	39.37	inches.
	$6.214X10^{-4}$	miles.
meters per minute	3.281	feet per minute.
	0.05468	feet per second.
	0.03728	miles per hour.
meters per second	196.8	feet per minute.
	3.281	feet per second.
	2.237	miles per hour.
	0.03728	miles per minute.
microhms	10^{-12}	megohms.
	10^{-6}	ohms.
miles	5280	feet.
	$6.336X10^{4}$	inches.
miles per hour	88	feet per minute.
	1.467	feet per second.
miles per hr. per sec.	1.467	feet par sec. per sec.
miles per minute	88	feet per second.
	52.10	knots.
	60	miles per hour.
mil-feet	$9.425X10^{-6}$	cubic inches.
millihenries	10^{-3}	henries.
millimeters	$3.281X10^{-3}$	feet.
	0.03937	inches.
	$6.214X10^{-7}$	miles.
	39.37	mils.
mils	$8.333X10^{-5}$	feet.
	10^{-3}	inches.
minutes (angle)	$2.909X10^{-4}$	radians.
ohms	10^{-6}	megohms.
	10^{6}	microhms.
ounces	0.0625	pounds.
ounces (troy)	480	grains.
	0.08333	pounds (troy).
ounces per square inch	0.0625	pounds per square inch.
pounds	444,823	dynes.
	16	ounces.
pounds (troy)	0.8229	pounds (av.).
pounds-feet squared	144	pounds-inches squared.
pounds-inches squared	$6.945X10^{-3}$	pounds-feet squared.
pounds of water	0.01602	cubic feet.
	27.68	cubic inches.
	0.1198	gallons.
pounds of water per min.	$2.669X10^{-4}$	cubic feet per sec.
pounds per cubic foot	$5.787X10^{-4}$	pounds per cubic inch.
	$5.456X10^{-9}$	pounds per mil foot.
pounds per cubic inch	1728	pounds per cubic foot.
	$9.425X10^{-6}$	pounds per mil foot.
pounds per square foot	0.01602	feet of water.
	$6.944X10^{-3}$	pounds per square inch.
pounds per square inch	2.307	feet of water.
	144	pounds per square foot.
quadrants (angle)	90	degrees.
	5400	minutes.
	1.571	radians.

These units	multiplied by	equal
quarts (dry)	67.20	cubic inches.
quarts (liq.)	$3.342X10^{-2}$	cubic feet.
	57.75	cubic inches.
radians	57.30	degrees.
	3438	minutes.
	0.6366	quadrants.
radians per second	57.30	degrees per second.
	9,549	revolutions per minute.
	0.1592	revolutions per second.
revolutions	360	degrees.
	4	quadrants.
	6.283	radians.
revolutions per minute	6	degrees per second.
	0.1047	radians per second.
	0.01667	revolutions per second.
revolutions per second	360	degrees per second.
	6.283	radians per second.
	60	revs. per minute.
revs. per sec. per sec.	6.283	radians per sec. per sec.
	3600	revs. per min. per min.
	60	revs. per min. per sec.
seconds (angle)	$4.848X10^{-6}$	radians.
square centimeters	$1.973X10^{5}$	circular mils.
	$1.076X10^{-3}$	square feet.
	0.1550	square inches.
square feet	$2.296X10^{-5}$	acres.
	$1.833X10^{8}$	circular mils.
	144	square inches.
square inches	$1.273X10^{6}$	circular mils.
	$6.944X10^{-3}$	square feet.
	10^{6}	square mils.
square meters	$2.471X10^{-4}$	acres.
	10.76	square feet.
	1550	square inches.
	$3.861X10^{-7}$	square miles.
square miles	640	acres.
	$27.88X10^{6}$	square feet.
	$3.098X10^{6}$	square yards.
square millimeters	$1.973X10^{3}$	circular mils.
square mils	1.273	circular mils.
	10^{-6}	square inches.
square yards	9	square feet.
	$3.228X10^{-7}$	square miles.
temp. (degs. Cent.) + 273	1	abs. temp. (degs. Cent.).
temp. (degs. Cent.) + 17.8	1.8	temp. (degs. Fahr.).
temp. (degs. Fahr.) + 460	1	abs. temp. (degs. Fahr.).
temp. (degs. Fahr.) — 32	5/9	temp. (degs. Cent.).
tons (long)	2240	pounds.
tons (metric)	2205	pounds.
tons (short)	2000	pounds.
tons (short) per sq. ft.	13.89	pounds per square inch.
tons (short) per sq. in.	2000	pounds per square inch.
watts	0.05688	B.t. units per min.
	10^{7}	ergs per second.
	44.27	foot-pounds per min.
	0.7378	foot-pounds per second.
	$1.341X10^{-3}$	horse-power.
	10^{-3}	kilowatts.
watt-hours	3.413	British thermal units.
	2656	foot-pounds.
	$1.341X10^{-3}$	horse-power-hours.
	10^{-3}	kilowatt-hours.
webers	10^{8}	maxwells.
yards	3	feet.
	36	inches.
	$5.682X10^{-4}$	miles.

HOW TO DESIGN A MODERN LIGHTING SYSTEM

1. **Analyze the Lighting Problem**
   Determine: 1) physical size and shape of the area; 2) architectural design and structural details; 3) occupancy, or end use, of the area; and 4) type and degree of severity of the seeing tasks which will exist.

2. **Selected Needed Lighting Levels**
   Refer to chart "New Lighting Levels as Recommended by the Illuminating Engineering Society" or Fig. 9-53 in 3rd Edition of the IES Lighting Handbook.

3. **Determine Desired Lighting Quality**
   Consider purpose for which lighting is to be used, visual envionment which is desirable, methods of light control and distribution.

4. **Select Proper Light Sources**
   Consider: 1) Efficiency (l/w); 2) total light output per lamp; 3) color (spectral) quality; 4) average rated life; 5) lumen depreciation throughout life; 6) heat produced by lamp; 7) effect of ambient temperature on light output and life; 8) light distribution control; 9) stroboscopic effect.

5. **Select Appropriate Lighting System**
   Consider from standpoint of suitability for architectural design, general appearance, structural details, overall efficiency, ease of maintenance, method of mounting, light distribution.

6. **Make a Lighting Calculation**
   Use appropriate method – see "Lighting Calculation Methods". Correct practice is to use the lumen method for interior lighting. Use "coefficient of utilizations" supplied by manufacturers of equipment being considered, or see Section 9 of 3rd Edition, IES Lighting Handbook.

7. **Prepare a Lighting Layout**
   Fit the number of luminaires determined by Step 6 into the area involved in a logical and practical arrangement. (Steps 6 and 7 should be worked out simultaneously, on a "trial and error" basis.)

8. **Provide Flexible Control of System**
   Use multiple switch control to individual multi-lamp units and multi-lamp areas, or a dimmer system for all lighting circuits.

9. **Analyze Available Electrical Power**
   Select the most economical and appropiate electrical distribution system possible from the available electric power system.

10. **Check Proposed Lighting System for Practicality**
    Verify all dimensions, double-check all calculations. Determine "watts/sq ft", check with normal practice. Determine impact of lighting load on air conditioning, analyze heat dissipation, check for interference with structural details and other system equipments, estimate and analyze first cost and operating cost.

HOW TO SELECT LUMINAIRES

Type of Light Source

Consider lumens per watt, size of lamps, color quality of light produced by the lamps, lamp life and replacement cost.

Type of Light Distribution

The type of lighting system and equipment layout selected will control the type of light distribution required for the luminaires or reflector equipment.

Initial Lumens Required

Light loss factors, spacing of outlets, and the desired lighting intensity maintained in service will establish light output in lumens required for each luminaire.

Overall Efficiency

Overall efficiency of luminaires varies from a high of approximately 90% downward. Consult manufacturers' light output and photometric data for luminaires under consideration.

Quality of Materials

Reflectors should have permanent type reflecting surface. Diffusing media should be durable, highly translucent, and should present an evenly lighted appearance. Gauge of metals should be adequate for necessary rigidity. Proper ventilation is important.

Ease of Maintenance

Luminaires should be easy to clean and relamp, with easily removable louvers, panels, etc. Ballasts should be readily accessible.

Appearance

Luminaires should present a good appearance and harmonize with interior and architectural treatment where used. Plain, simple lines are usually preferred.

Cost

Equipment cost is only part of the cost of good lighting. High first cost of equipment in a well designed lighting system may readily provide low cost lighting. Consider operating amd maintenance costs; then select a low-cost "system".

LAYOUT REMINDERS

For the Lighting System Designer

- *A customer buys a lighting system to provide an adequate, comfortable and appropriate lighting result* -- not because he wants luminaires, lamps, conduit and wiring.
- *Luminaires and lighting equipment selected should be appropriate for the structure and the seeing problems involved.* Appearance, functional design, direct and reflected glare, shadows, maintenance, and lighting efficiency are all factors to be considered.
- *The lighting layout should fit the structural details of the building.* If plans and drawings are not available, survey the interior and note location of columns, beams, obstructions and other architectural features.
- *Use conventional layouts with symmetrical spacing of units,* if possible, with luminaires parallel and perpendicular to walls. Special geometrical patterns may be suitable in some cases but should be avoided generally unless they serve a specific functional or design purpose.
- *Use continuous-row fluorescent luminaires in preference to individual units.* The completed installation will look better and usually results in economies in wiring and installation.
- *Recessed and built-in lighting equipment does not light the ceiling.* Check your layout and room surface reflectances to see that use of such equipment will not produce uncomfortably dark ceilings nor excessive brightness ratios in the normal field of view.
- *Efficiency of trans-lighted ceilings is dependent to a great extent on the reflectance of the plenum cavity.* Be sure lamps can be mounted sufficiently high above diffusers or louvers to provide uniform brightness and spaced properly to provide desired intensity. Paint entire cavity white with highest possible reflectance.
- *Suspended luminaires of the direct-indirect type often produce the best lighting result most economically.* Check the suspension length carefully and limit it to the dimension which gives reasonably uniform ceiling brightness.
- *Luminaire spacings should be used which produce uniform illumination* and prevent undesirable shadows.
- *Flexible lighting layouts which will permit more luminaires or lamps to be added later* should be planned. This will permit an increase in lighting intensity without spoiling the symmetry or architectural harmony of the initial installation.
- *Plan the maintenance program along with the lighting layout.* Be sure that all luminaires and lighting equipment are easily accessible and are designed to be cleaned easily and quickly.
- *Consider the finish and reflection factor of ceiling and side walls.* Recommend proper colors and finishes to provide surrounding brightness conditions which promote eye comfort and good seeing conditions.
- *Double check all calculations and details* to insure the proper number of units and the ultimate desired lighting result.

LIGHTING CALCULATIONS METHODS

Type Lighting	Method of Calculation
General	Lumen Method Interflectance Method Zonal Lumen Method Point-by-Point Method
Supplementary	Point-by-Point Method Lumens-per-Foot Method
Floodlighting	Beam Lumens Method Point-by-Point Method
Street	Isocandle Curves

LIGHTING SYSTEM VOLTAGES

60 Cycle		High Frequency
Incandescent Filament Lamps	Electric Discharge Lamps	Fluorescent Lamps
28–32	110–125	400**
110–125	200–216	600**
220–240	220–240	
	240–280	
	440–480*	

*Mercury lamp transformers.

**Phase-to-phase voltage, with grounded neutral to provide less than 300 volts to ground (NEC).

FORMULAS FOR GENERAL LIGHTING DESIGN

Lumen Method of Calculation

Average lumens reaching work plane = total initial lamp lumens × CU × MF

$$\text{Average footcandles at work plane} = \frac{\text{total initial lamp lumens} \times \text{CU} \times \text{MF}}{\text{area of room in sq ft}}$$

= total watts per sq ft × overall lumens per watt × CU × MF

$$\text{Area per lamp (sq ft)} = \frac{\text{initial lumens per lamp} \times \text{CU} \times \text{MF}}{\text{average footcandle level desired}}$$

$$\text{Area per luminaire (sq ft)} = \frac{\text{initial lumens per lamp} \times \text{no. of lamps per luminaire} \times \text{CU} \times \text{MF}}{\text{average footcandle level desired}}$$

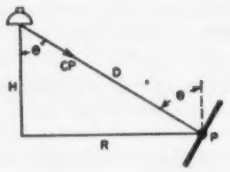
$$\text{Total watts per sq ft} = \frac{\text{average footcandle level desired}}{\text{overall lumens per watt} \times \text{CU} \times \text{MF}}$$

CU = Coefficient of Utilization
MF = Maintenance Factor

Point–by–Point Method of Calculation

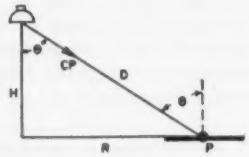
Illumination Normal to Light Ray:

$$E_n = \frac{CP}{D^2}$$



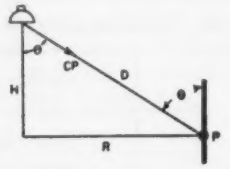
Horizontal Illumination:

$$E_h = \frac{CP}{D^2} \text{ Cos } \theta = \frac{CP}{H^2} \text{ Cos}^3 \theta = \frac{CP \times H}{D^3}$$



Vertical Illumination:

$$E_v = \frac{CP}{D^2} \text{ Sin } \theta = \frac{CP}{H^2} \text{ Cos}^2 \theta \text{ Sin } \theta = \frac{CP \times R}{D^3}$$



E_n = Illumination on plane normal to light ray (footcandles)
E_h = Illumination on horizontal plane when light ray hits plane at angle θ (footcandles)
E_v = Illumination on vertical plane when light ray hits plane at angle θ (footcandles)
CP = Intensity of light source in direction of point P (candlepower)
D = Distance from light source to point P (feet)
H = Vertical mounting height of light source above plane of measurement (feet)
R = Horizontal distance from light source to point P (feet)
θ = Angle between light ray and a perpendicular line through light source (or a line perpendicular to horizontal plane through point P)

ROOM RATIO FORMULAS

Direct, Semi-Direct and General Diffuse Lighting:

$$\text{Room Ratio} = \frac{W \times L}{\text{Mounting height above work plane} \times (W+L)}$$

Semi-Indirect and Indirect Lighting:

$$\text{Room Ratio} = \frac{3 \times W \times L}{2 \times \text{ceiling height above work plane} \times (W+L)}$$

W = width of room

L = length of room

RELATION BETWEEN ROOM RATIO AND ROOM INDEX*

Average Room Ratio	Range of Room Ratios	Room Index
5.0	4.5 up	A
4.0	3.5 to 4.5	B
3.0	2.75 to 3.5	C
2.5	2.25 to 2.75	D
2.0	1.75 to 2.25	E
1.5	1.38 to 1.75	F
1.25	1.12 to 1.38	G
1.00	0.9 to 1.12	H
0.8	0.7 to 0.9	I
0.6	Less than 0.7	J

*Room ratios are preferred because of their greater accuracy. Use this table for conversion of Coefficient of Utilization data based on room indexes.

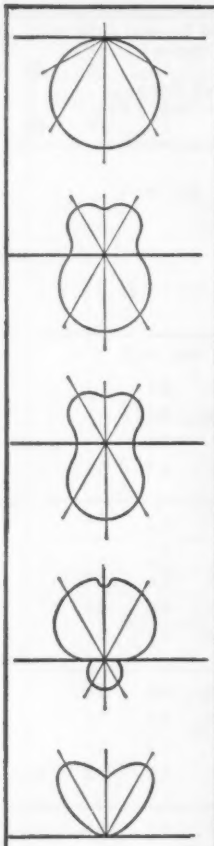
ROOM RATIOS

Room Width & Length (ft)		Direct, Semi-Direct and General Diffuse Height of luminaire above floor (ft)						
		8	10	12	15	19	27	43
		Semi-Indirect and Indirect Approx. ceiling height above floor (ft)						
W	L	10½	13½	16½	21	27	39	63
10	10	0.9	0.7	0.5				
	14	1.1	0.8	0.6	0.5			
	18	1.2	0.9	0.7	0.5			
	24	1.3	0.9	0.7	0.6			
	30	1.4	1.0	0.8	0.6			
14	14	1.3	0.9	0.7	0.6			
	20	1.5	1.1	0.9	0.7	0.5		
	30	1.7	1.3	1.0	0.8	0.6		
	40	1.9	1.4	1.1	0.8	0.6		
	60	2.1	1.5	1.2	0.9	0.7	0.5	
18	20	1.7	1.3	1.0	0.8	0.6		
	30	2.0	1.5	1.2	0.9	0.7		
	40	2.3	1.6	1.3	1.0	0.8	0.5	
	60	2.5	1.8	1.4	1.1	0.8	0.6	
	80	2.7	2.0	1.5	1.2	0.9	0.6	
25	30	2.5	1.8	1.4	1.1	0.8	0.6	
	40	2.8	2.1	1.6	1.2	0.9	0.6	
	60	3.2	2.4	1.9	1.4	1.1	0.7	
	80	3.5	2.5	2.0	1.5	1.2	0.8	0.5
40	40	3.6	2.7	2.1	1.6	1.2	0.8	0.5
	60	4.4	3.2	2.5	1.9	1.5	1.0	0.6
	80	4.9	3.6	2.8	2.1	1.6	1.1	0.7
	100	5.2	3.8	3.0	2.3	1.7	1.2	0.7
60	60	5.5	4.0	3.2	2.4	1.8	1.2	0.8
	100	6.8	5.0	3.9	3.0	2.3	1.5	0.9
	140	7.6	5.6	4.4	3.4	2.6	1.7	1.0
80	80	7.3	5.3	4.2	3.2	2.4	1.6	1.0
	140		6.8	5.4	4.1	3.1	2.1	1.3
	200		7.6	6.0	4.6	3.5	2.3	1.4
100	100		6.7	5.3	4.0	3.0	2.0	1.2
	150			6.3	4.8	3.6	2.5	1.5
	200			7.0	5.3	4.0	2.7	1.6
120	120			6.3	4.8	3.6	2.5	1.5
	160			7.2	5.5	4.2	2.8	1.7
	200				6.0	4.5	3.1	1.9

$$RR = \frac{W \times L}{H\,(W + L)}$$

For Type D, SD and GD, H = distance from luminaire to work plane 30 in. from floor.

For Type SI and I, H = distance from ceiling to work plane 30 in. from floor.



TYPES OF LIGHTING SYSTEMS

ICI* Light Distribution	Type of Luminaires	Type of Mounting	Lighting System Classification
Direct 90% to 100% Downward	Recessed	In Ceiling	Recessed (Inc. or Fl.)
	Individual Unit Continuous Row	On Ceiling	Surface Mounted Direct
	Individual Unit Continuous Row	On Ceiling	Suspended Direct
	Luminous Architectural Elements	On Ceiling, Side Walls, or Columns	Architectural
	Decorative Ornamental	On Ceilings or Walls	Ornamental
	Large-Area Low-Brightness	Recessed in Ceiling	Luminous Element
	Diffuser Ceilings Louver Ceilings	From Ceilings	Translighted Ceiling
Semi-Direct 60% to 90% Downward	Individual Unit Continuous Row	On Ceiling	Surface Mounted Semi-Direct
	Individual Unit Continuous Row		Suspended Semi-Direct
	Luminous Cornice	On Wall near Ceiling	Architectural
General Diffuse 40% to 60% Downward	Individual Unit	On Ceiling	Suspended
	Continuous Row		Direct-Indirect
Semi-Indirect 60% to 90% Upward	Individual Unit Continuous Row	On Ceiling	Suspended Semi-Indirect
	Luminous Cove Wall Bracket With Downward Component	On Wall	Semi-Indirect
	Luminous Ornamental	On Ceiling	Suspended Semi-Indirect
Indirect 90% to 100% Upward	Individual Unit Continuous Row	On Ceiling	Suspended Indirect
	Wall Urns Cove Pedestal Ceiling Soffit**	On Wall On Wall or In Ceiling Floor or Counter Top In Ceiling	Indirect Cove Indirect Indirect**

International Congress on Illumination approved classification of lighting systems according to a range of distribution of total light output upward or downward, in percentages as shown. A more detailed classification, as given here, has been found through practice to be more practical.
**According to ICI practice, soffit lighting might be classified as "direct". In actual practice, it is normally referred to as "indirect," since it is actually a form of cove lighting.

LUMINAIRE MOUNTING AND SPACING

Mounting Height of Luminaire above Floor (feet)	COMMERCIAL						INDUSTRIAL		
	Direct	Semi-Direct		Semi-Indirect		Indirect	Spread	Concentrating	
Ceiling Height for Indirect and Semi-Indirect Luminaires (feet)	Usual Spacing Between Units	Max. Spacing Between Units	Spacing* from Walls	Spacing Between Units	Spacing* from Walls	Length of Suspension	Maximum Spacing[1] (ft.)		
							Mounting Heights Above Floor	Spacing Between Units[2] Spread	Concen't.
8	7	7½	3	9	3	1-1½	15	12	–
9	8	8	3	9½	3	1-1½	16	12	–
10	9	9	3½	10½	3½	1½-2½	18	18	–
11	10	10½	3½	12	3½	1½-2½	20	20	–
12	10-12	12	4	14	4	2-3	22	20	–
13	10-12	13	4	15	4	2-3	24	23	16
14	10-13	15	5	17	5	3-4	26	25	17
15	10-13	17	5	19	5	3-4	28	30	18
16	10-13	19	6	21	6	4-5	30 or more	30	20
18	10-20	21	6	23	6	4-5			
20 or more	18-24	24	7	26	7	4-6			

*Spacings apply where desks or benches are next to wall, otherwise one-half the spacing between units is satisfactory.
[1]Units may have to be spaced closer to obtain desired illumination values.
[2]Where benches or machines are next to wall, spacing from wall should not exceed 1/3 spacing between units. Otherwise 1/2 unit spacing is suitable.

NEW LEVELS OF ILLUMINATION

Presented here is a condensed compilation of the new (1958) footcandle values recommended for specific visual tasks by the Illuminating Engineering Society and classified according to severity of the visual task. Note that these values apply to seeing tasks, and are not "average" values for general illumination on the horizontal plane. Higher initial levels should be provided as required by maintenance conditions, and special luminaire arrangements should be used for visual tasks in a plane other than horizontal. For more detailed information, see Fig. 9-53 in the IES Lighting Handbook -- 3rd Edition.

Severity of Visual Task

SPECIAL APPLICATIONS – 1000 footcandles and above. (1000 fc) – Extra fine bench work, grinding; precision manual arc welding; dental chair; feature displays – show windows; self-service stores; highly critical inspection. (2000 fc) – cloth inspection, emergency room, local. (2500 fc) – autopsy table; cystoscopic table; surgery operating table.

MOST DIFFICULT – 500 to 1000 footcandles. Fine bench and machine work, fine automatic machines, medium grinding, fine buffing and polishing; fine assembly; fine inspection; spotting; sewing; feature displays – show windows, service store interiors.

VERY DIFFICULT – 200 to 500 footcandles. (200 fc) – Auto final assembly, finishing, inspection line; color grading, inspection, examination in canning; repair and alteration in cleaning plant; tobacco grading and sorting; hospital fracture table; detailed drafting; designing, cartography in offices. (300 fc) – clay products color and glazing; cloth cutting; pressing; leather working – grading, matching, cutting, sewing; paint shops – extra fine hand painting and finishing.

DIFFICULT – 100 to 200 footcandles. (100 fc) – Regular office work, reading good reproductions, reading or transcribing shorthand, active filing, index reference, mail sorting; ticket counters; spray booths; general assembly line work; medium assembly; difficult inspection; medium bench and machine work, rough grinding, medium buffing and polishing; art gallery displays and on statuary; laboratory close work; etc. (150 fc) – accounting, auditing, tabulating, bookkeeping, business machine operation, rough layout drafting; bank teller's station; proof reading, imposing stones; hand and machine pressing.

ORDINARY – 30 to 100 footcandles. (50 fc) – a minimum for any visual task requiring more than casual use of the eyes; general lighting level for most industrial interiors; ordinary inspection; rough bench and machine work. (70 fc) – reading or transcribing handwriting in ink or medium pencil on good quality paper; school classrooms; work shop, bench work; study desks; drilling, riveting, screw fastening.

EASY – 30 footcandles and below. Less than 30 footcandles do not appear desirable in locations which involve visual tasks. Use in areas not involving critical or prolonged seeing, such as conference rooms, inactive files, washrooms, corridors, elevators, stairways, rough assembly, wrapping rooms, exterior areas generally, storage, auditoriums, lobbies, rough benchwork, wood sawing, parking lots, waiting rooms, rest room, smoking room, etc.

Illumination in Footcandles

2500
2000
1500
1000
700
500
300
200
150
100
70
50
30
20
15
10

NOTE: A) Illumination values for service areas should be not less than one-fifth that in adjacent areas, and in no case should they be less than 10 footcandles.
B) In general, intensities of 200 footcandles and above should be obtained with a combination of general lighting plus specialized supplementary lighting, taking special care to keep within recommended brightness ratios (see table).

RECOMMENDED ILLUMINATION FOR RESIDENCES (Footcandles)*

General Lighting	
Entrances, hallways, stairways, stair landings	10**
Living room, dining room, bedroom, family room, sun room, library, game or recreation room	10**
Kitchen, laundry, bathroom	30
Specific Visual Tasks	
Table games	30
Kitchen sink	70
Kitchen range and work surfaces	50
Laundry, trays, ironing board, ironer	50
Reading and writing, including studying	
Books, magazines, newspapers	30
Handwriting, reproduction and poor copies	70
Desks, study	70
Reading music scores	
Simple scores	30.
Advanced scores	70
Sewing	
Dark fabrics (fine detail, low contrast)	200
Prolonged periods (light to medium fabrics)	100
Occasional periods (coarse thread, large stitches, high contrast thread to fabric)	30
Shaving, makeup, grooming; on the face at mirror locations	50

*Minimum on the visual task.
**General lighting for these areas need not be uniform.

RECOMMENDED REFLECTANCE VALUES FOR INDUSTRIAL AREAS

Surface	Reflectance (%)
Ceiling	80
Wall	60
Desk and bench tops	35
Machines and equipment	25 to 30
Floors	not less than 15

Source: IES Lighting Handbook – 3rd Edition

RECOMMENDED SURFACE REFLECTANCES FOR OFFICES

Surface	Reflectance Range (%)
Ceiling finishes	80 – 92
Walls	40 – 60
Furniture	26 – 44
Office machines and equipment	26 – 44
Floors	21 – 39

Source: IES Lighting Handbook – 3rd Edition

RECOMMENDED BRIGHTNESS RATIOS FOR INTERIOR LIGHTING

Condition	Ratio
Between visual tasks and adjacent surroundings Example: White paper and desk top	1 to 1/3
Between visual tasks and more remote darker surfaces Example: White paper on desk & floor	1 to 1/10
Between visual tasks and more remote brighter surfaces Example: White paper on desk and luminaires	1 to 10
Between luminaires and adjacent surfaces in normal field of view	20 to 1
Anywhere within normal field of view Example: Luminaires and floor	40 to 1

These ratios are recommended as maximums: reductions are generally beneficial. See also Fig. 11-8 and Fig. 14-2 in IES Lighting Handbook – 3rd Edition

RATED AVERAGE LIFE, FLUORESCENT LAMPS

Type of Lamps	Burning Hours Per Start			
	3	6	12	Continuous*
T-8 and T-12 preheat, rapid start, high output; T-6, T-8 and T-12 slimline; T-12 instant start; T-17 preheat; All circlines	7500	Plus 25%	Plus 60%	Plus 150%
T-17 instant start; 6-, 8-, 13-watt T-5 preheat 14-watt T-12 preheat	6000			
Power Groove lamps	5000			
4-watt T-5	4000			
Cold cathode LP	15000	Life not affected by number of starts		
Cold cathode HP	25000			

*Light output depreciates steadily as lamps are burned. Where infrequent starting, or continuous burning are involved, lamps should be replaced before they reach average life, for maximum lighting value.

Source: General Electric Co. Lamp Bulletin No. LS-101

RATED AVERAGE LIFE, MERCURY VAPOR LAMPS

Type Lamps	Rated Life (Hours)
PAR-38 bulb, 100-watt	2000 - 6000
PS-25 and BT-25 bulbs, 100-watt; PS-35 bulb, 125-watt; BT-28 bulb; 175-watt; BT-37 bulb, 430-watt; T-9½ bulb, 3,000-watt	6000
BT-28 bulb, 250-watt: T-16, BT-24, BT-37 R-52, R-57 bulbs, 400-watt; BT-56 bulb, 1000-watt	6000 - 7000
BT-37 bulb, 425-watt; BT-46 bulb, 700-watt	7000
R-57 bulb, 750-watt	8000
BT-56 bulb, 700-watt	9000

Burning hours shown are "economic life" under typical operating conditions. Actual burning hours may be up to 50% greater, depending on operating conditions.

Source: Based on data shown in Fig. 8-90, IES Lighting Handbook — 3rd Edition.

RATED AVERAGE LIFE, INCANDESCENT LAMPS

Type Lamps	Rated Life (Hours)
General Service Lamps; sizes 75, 100, 150, 200, 300 watts, A and PS bulbs	750
General Service Lamps; sizes 300, 500, 750, 1000, 1500 watts, PS bulbs, mogul base	1000
Lumiline Lamps, 30, 40, 60 watts	1500
Reflector and Projector Lamps	2000
Extended Life, Special Service Lamps 25 to 1500 watts	2500

Source: Lamp manufacturers' bulletins.

DATA ON TYPICAL FLUORESCENT BALLASTS
(Used for General Lighting)

Number and Type Lamp	Weight (lbs)	Line Current (amps)	Watts Consumed	
			By Ballast	Per Lamp*
For 60-cycle, 110-125 Volt Circuits				
2-20/T12	3 1/3	.42	9	24.5
2-30/T8	4	.70	17	38.5
2-40/T12	4	.85	18	49.0
2-40/T12/IS	9 1/3	.95	30	55.0
2-40/T12/RS	4	1.30	13	46.5
3-40/T12/RS	8	1.30	20	46.7
2-48T12	9 3/4	.95	30	53.0
2-72T12	2	1.40	29	69.5
2-96T12	13 3/4	1.60	34	91.0
2-48T12/HO	10	1.20	20	70.0
2-72T12/HO	12 1/2	1.70	30	100.0
2-96T12/HO	16	2.00	40	125.0
2-48PG17	15	2.60	41	128.5
2-72PG17	16	3.20	50	180.0
2-96PG17	16	4.00	55	227.5
For 60-cycle, 220-250 Volt Circuits				
2-40/T12	5 2/3	.43	20	50.0
2-90/T17	14 1/3	.93	31	105.5
2-40/T12/RS	4	.41	12	46.0
2-96T12	12	.80	29	88.5
2-96/T12/HO	13	1.10	54	132.0
For 60-cycle, 240-280 Volt Circuits				
2-40/T12	5 1/4	.37	18	49.0
2-90/T17	14 1/3	.83	31	105.5
2-48T12/HO	10	.56	30	55.0
2-48T12	5 3/4	.40	20	48.0
4-90/T17	16 1/2	1.65	36	99.0
For 60-cycle, 260-290 Volt Circuits				
2-40/T12	3 1/2	.19	10	45.0
2-40/T12/RS	4	.80	10	45.0
3-40/T12/RS	8	.55	20	46.7
2-96/T12/HO	15	.94	54	132.0
2-72T12	6	.62	25	67.5
2-96T12	6	.62	25	86.5
2-96PG17	12	1.85	75	237.5

*Lamp wattage plus proportional watts loss in ballast.

Based on manufacturers' bulletins.

LAMP SPECIFICATIONS

STANDARD FLUORESCENT LAMPS

Lamp Designation	Burnouts Per BLH*	Light Output** Initial Lumens	Initial L/W*	Brightness (Foot-Lamberts)
Preheat Start Lamps (Starters Required)				
F202T12	134	1,030	51.5	1,600
F40CW**	48	2,800	70.0	2,100
F90T17	26	5,200	57.6	2,300
F40CW/3	43	3,100	77.5	2,350
Instant Start Lamps				
F40T12/IS	54	2,650	66.2	1,900
F40T17/IS	55	2,650	66.2	1,150
F48T12 Slimline	57	2,600	66.6	2,100
F72T12	37	4,100	73.2	2,100
F96T12 Slimline	26	5,600	75.6	2,100
Rapid Start Lamps (No Starters Required)				
F40CW**	48	2,800	70.0	—
F40CW/3	43	3,100	77.5	—
F48T12/HO	40	3,500	58.4	2,800
F72T12/HO	25	5,550	65.2	2,800
F96T12/HO	18	7,600	72.5	2,800
F48T12/1500	21	6,200	56.8	5,300
F72T12/1500	14	9,300	59.2	5,100
F96T12/1500	10	13,250	65.0	5,050
F48PG17	22	6,900	62.7	...
F72PG17	14	10,900	68.2	...
F96PG17	9	15,000	70.0	...

* Based on 7,500 hours average rated life, and lumen output of cool white lamps.
** All lumen values for cool white lamps.
* Lumens per watt, lamp watts only
** New 40-watt T12 lamp, interchangeable between preheat circuits and rapid start circuits.
*** Brightness varies. See manufacturers' literature for details.
Source: General Electric Co., Lamp Dept., and IES Lighting Handbook — 3rd Edition

COLD CATHODE FLUORESCENT LAMPS

Lamp Designation	Lamp Current (ma)	Lamp Watts (HP)*	Light Output Initial Lumens	Initial L/W	Brightness (Foot-Lamberts)
2545 (T–8)	120	28	1000	35.8	1100
	150	33	1200	32.5	1280
	200	40	1500	37.5	1600
2569 (T8)	120	37	1600	43.3	1210
	150	43	1850	43.0	1440
	200	52	2200	42.4	1650
2593 (T8)	120	46	2200	47.8	1250
	150	54	2600	48.2	1480
	200	65	3200	49.4	1700
Hairpin 6–in. Dia.	120	46	2200	47.8	1250
	150	54	2600	48.2	1480
	200	65	3200	49.4	1700

*High Pressure

Source: Based on data in Fig. 8–101, IES Lighting Handbook — 3rd Edition

STANDARD INCANDESCENT LAMPS

Lamp Designation Watts	Bulb	Rated Life (Hours)	Burnouts Per BLH**	Light Output Initial Lumens	Initial L/W
75	A-19	750	...	1,150	15.3
100	A-19*	750	...	1,700	17.0
150	A-23	750	...	2,700	18.0
200	PS-25	750	351	3,800	19.0
200	PS-30	750	360	3,720	18.6
300	PS-30	750	223	6,000	20.0
300	PS-35	1000	174	5,750	19.2
500	PS-40	1000	109	9,900	19.8
750	PS-52*	1000	60	16,700	22.3
1000	PS-52*	1000	44	23,000	23.0
1500	PS-52	1000	30	33,000	22.0
750	T-24	1000	70	14,200	19.0
1000	T-24	1000	50	20,000	20.0
500	R-52	2000	64	7,850	15.8
750	R-52	2000	39	12,700	17.0
1000	RB-52*	2000	28	18,000	18.0
550	R-57	2000	62	8,100	14.8
800	R-57	2000	37	13,500	16.9
1000	R-57	2000	31	16,300	16.3

* Coiled-coil filament axially mounted.

** Average lamp burnouts per billion lumen hours (calculated).

Source: General Electric Co., Lamp Department, and IES Lighting Handbook — 3rd Edition.

STANDARD MERCURY VAPOR LAMPS

Lamp Designation Watts	Bulb	ASA*	Rated Life (Hours)	Burnouts Per BLH**	Initial Lumens	Initial L/W***
100	PS-25	H4AC	6000	42	4,000	40.0
175	BT-28	H22KD	6000	23	7,200	41.1
250	BT-28	H5KF	6-7000	16-14	10,500	42.0
400	BT-24	H25DE	6-7000	11-9	15,500	38.7
400	BT-37	H1LB	6-7000	7-6	23,000	57.4
425	BT-37	H17LB	7000	7	20,000	47.5
430	BT-37	H24LB	6000	9	18,500	43.0
700	BT-46	H18NE	7000	3.6	40,000	57.2
700	BT-56	H15GW	9000	4.2	34,500	49.4
750	R-57	—	8000	5.5	22,500	30.0
1000	BT-56	H18GW	6-7000	3.2-2.8	51,800	51.8
1000	BT-56	H12GW	6-7000	2.9-2.5	58,000	58.0
3000	T-9½	H9FJ	6000	1.3	132.000	43.0

* New ASA designations have been adopted by all light source manufacturers.

** Average lamp burnouts per billion lumen hours (calculated), based on average rated life. Lamp life may be increased by as much as 50% under certain operating conditions.

*** Based on lamp watts only.

Source: Based on data given in Fig. 8-90, IES Lighting Handbook — 3rd Edition.

REFLECTOR AND PROJECTOR LAMPS

Bulb Types	Watts	Beam Spread (Degrees)*	Approx. Beam Lumens	Candlepower (10% Cone)**	Approx. Total Lumens
Reflector Spotlighting Lamps					
R-30	75	50	400	1,800	770
R-40	150	40	810	6,000	1,780
R-40	300	35	1,800	13,500	3,700
R-40	500	35	3,100	22,000	6,400
Reflector Floodlighting Lamps					
R-20	30	80	145	350	200
R-30	75	130	610	430	770
R-40	150	110	1,500	1,250	1,780
R-40	300	115	2,800	2,700	3,700
R-40	500	115	5,400	5,200	6,400
Projector Spotlighting Lamps					
PAR-38	75	30x30	480	4,000	750
PAR-38	150	30x30	1,100	10,500	1,730
PAR-46	200	17x23	1,200	32,000	2,350
PAR-56	300	15x20	1,800	70,000	3,650
PAR-64	500	13x20	3,000	110,000	6,000
Projector Floodlighting Lamps					
PAR-38	75	60x60	600	1,700	750
PAR-38	150	60x60	1,350	3,700	1,730
PAR-46	200	20x40	1,300	11,000	2,350
PAR-56	300	20x35	2,000	22,000	3,650
PAR-56	300	30x60	2,100	10,000	3,650
PAR-64	500	20x35	3,400	35,000	6,000
PAR-64	500	35x65	3,500	12,000	6,000

*Measured to 10% of maximum candlepower
**Average initial CP in 10° zone
Source: G.E. Co. Lamp Bulletin LS-152, Feb. 1959

COMPARATIVE STROBOSCOPIC EFFECT OF VARIOUS LIGHT SOURCES

Operated on 60-Cycle Supply

Lamp Type	Method of Operation	Relative Stroboscopic Effect
Incandescent		
200-watt		1
40-watt		7
Fluorescent		
Green	Single-lamp ballast	11
Blue	Single-Lamp ballast	49
White	Single-lamp ballast	19
White	2-lamp ballast	9
White	Single-lamp ballast on each phase of 3-phase circuit (3 lamps)	3
White	3 lamps: 1 on single-lamp ballast, 2 on 2-lamp ballast	14

Also see Figs. 8-48 and 8-49 in IES Lighting Handbook 3rd Edition

Source: Westinghouse Lighting Handbook (1956)

COLOR TEMPERATURE OF VARIOUS LIGHT SOURCES

Light Source	Degrees K*
Natural Daylight	
Light from clear blue sky	12,000-27,000
Light from hazy or smoky sky	7,500-8,400
Light from totally overcast sky	6800
Sunlight, plus light from clear sky (noon)	6500
Direct sunlight (noon in midsummer)	5800
Light from heated sources**	
"Daylight" fluorescent lamps**	6500
Blue (daylight) photoflash lamps	6300
Cool white fluorescent lamps**	4500
Clear photoflash lamps	3800
White (standard) fluorescent lamps**	3500
Photoflood lamps	3400
500-watt projection lamp	3175
1000-watt standard incandescent lamp	3000
500-watt standard incandescent lamp	2950
60-watt standard incandescent lamp	2800

*Absolute temperature scale having its zero at −273°C (−459.4°F).
**By definition, color temperature applies only to light generated by heat (same color as a black body at that temperature), but fluorescent lamps have been arbitrarily color-designated in degrees Kelvin for purposes of simplicity.

FLUORESCENT LAMP LUMEN OUTPUT RATIOS

(Standard Cool White = 100)

Color of lamps	Multiplying Factor
Deluxe Cool White (CW/X)	0.71
Deluxe Warm White (WW/X)	0.71
Daylight (D)	0.93
Soft White (SW)	0.68
Green (G)	1.20
Gold (GO)	0.60
Blue or Pink (B or PK)	0.45
Red (R)	0.06

INTERCHANGEABILITY OF FLUORESCENT LAMPS

40-watt T-12 Bipin

Lamp Type	Ballast Type		
	Preheat	Instant Start	Rapid Start
Preheat	O.K.	Not Recommended	Will Not Start
Instant	Will Not Start	O.K.	Will Not Start
Rapid Start	O.K.	Not Recommended	O.K.

Source: IES Lighting Handbook – 3rd Edition.

LOAD AND OUTPUT OF TYPICAL FLUORESCENT LUMINAIRES

Fluorescent Lamps				1-Lamp Luminaire			2-Lamp Luminaire*		
Type Lamp	Length (ins)	Lamp Watts	Lamp Current (ma)	Lumens	Total Watts	L/W	Lumens	Total Watts	L/W
40T12	48	39.6	430	2,650	50.6	52.4	5300	97.2	54.5
40T12	48	–	–	2,800	–	–	5600		
40T12/1S	48	40.6	425	2,500	60.0	41.6	5000	100.0	50.0
40T12/RS	48	39.6	430	2,650	52.0	51.0	5300	92.0	57.6
40CW/3	48	–	–	3,100	–	–	6200		
48T12	48	38.5	428	2,360	–	–	4720	107.0	44.1
48T12	48	38.5	428	2,360	–	–	4720	● 97.0	48.6
48T12/RS	48	60.0	800	3,350	90.0	37.2	6700	140.0	47.9
48T12/RS	48	109.0	1500	6,200	–	–	12,400	250.0	49.6
48PG17	48	107.0	1500	6,000	–	–	12,000	255.0	47.1
40T17/1S	60	42.5	420	2,500	62.5	40.0	5000	105.0	47.6
90T17	60	90.0	1550	5,200	111.0	46.9	10,400	211.0	49.3
72T12	72	56.0	425	3,600	–	–	7,200	146.0	49.3
72T12	72	56.0	425	3,600	–	–	7,200	●137.0	52.5
72T12/RS	72	80.5	800	5,250	125.0	42.0	10,500	200.0	52.5
72T12/RS	72	157.0	1500	9,300	–	–	18,600	390.0	47.7
72PG17	72	155.0	1500	9,300	–	–	18,600	360.0	51.6
96T12	96	73.5	425	5,100	–	–	10,200	181.0	56.4
96T12	96	73.5	425	5,100	–	–	10,200	●175.0	58.2
96T12/RS	96	105.0	800	7,300	135.0	54.1	14,600	254.0	57.5
96T12/RS	96	204.0	1500	13,250	–	–	26,500	480.0	55.2
96PG17	96	215.0	1500	15,000	–	–	30,000	485.0	61.9

*Using HPF lead-lag ballasts and standard cool white lamps. For lumen output using other color lamps, use the multiplying factors given in table "Fluorescent Lamp Lumen Output Ratios"

●Based on use of 2-lamp series ballasts.

Source: Computed based on data in Figs. 8-98, 8-99, 8-100 and 8-103 of IES Lighting Handbook – 3rd Edition, and General Electric Co. Bulletin LS-101, July, 1958.

FLUORESCENT LAMP COLOR GUIDE

Application	Deluxe		Standard	
	Warm	Cool	Warm	Cool
Groceries	–	Good	–	Fair
Meat Markets	–	Good	–	Fair
Bakeries	Good	Fair	–	–
Confectionery	Good	Fair	–	–
Restaurants	Good	–	–	–
Tea Rooms	Good	–	–	–
Taverns	Good	–	Fair	–
Men's Wear	Fair	Good	–	Fair
Women's Wear	Good	–	Fair	–
Children's Wear	Good	–	Fair	–
Shoe Store	Good	–	Fair	–
Barber & Beauty*	Good*	Fair	–	–
Drug Stores	–	Good	–	Fair
Florist	Fair	Good	–	–
Jewelry	–	Good	–	Fair
Home Furnishings	Good	Fair	–	–
Variety	–	Good	–	Fair
Schools	–	–	–	Good
Offices	–	–	Good	Fair

*Except for tinting

Source: Lighting Products Inc.

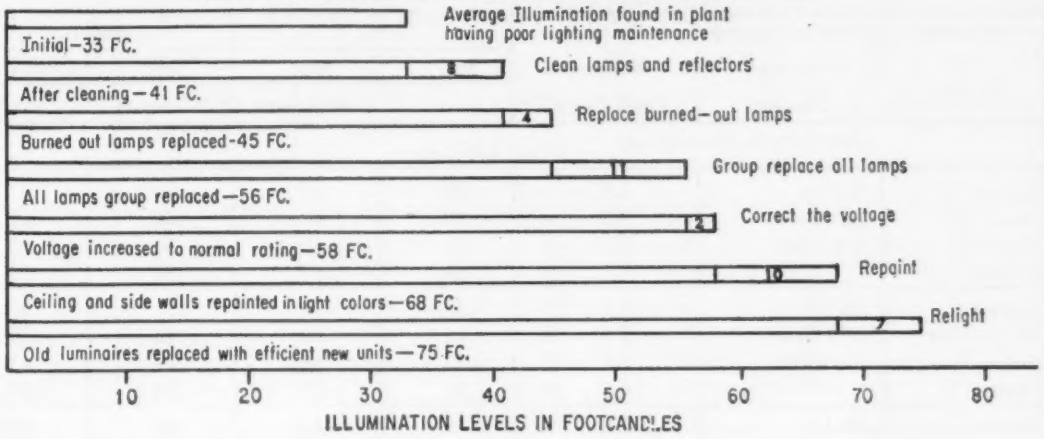
EFFICIENCY OF PRODUCTION OF COLORED LIGHT

Color	Approx. Lumens per Watt	
	Fluorescent	Filament*
Blue	20 to 26	0.5 to 1.5
Green	55 to 75	0.5 to 3
Yellow	22 to 31	5 to 10
Red	3 to 5	1 to 14

*Based on 100-watt lamp with typical color filters of various kinds; colored bulbs, glass roundels and caps, gelatins, dyes and lacquers.

Source: Westinghouse Lighting Handbook - 1956.

MAINTENANCE STEPS FOR INCREASED LIGHTING LEVELS



Lighting maintenance is a highly important factor in lighting system design. The above chart illustrates its effectiveness on a typical lighting installation. Increased reflectances, improved brightness ratios, and higher lighting levels may be effected through simple maintenance procedures.

Select luminaires and lighting equipment which include easy maintenance features designed and built into the units by the lighting equipment manufacturers; and provide easy access to all luminaires and lighting equipment.

MAJOR CAUSES OF LIGHT LOSS
In Lighting Systems

Cause of Depreciation	Percent Loss
Lamp Depreciation (End of rated life)	
Incandescent	20
Fluorescent	30
Mercury Vapor	23
Circuit Voltage Depreciation	
With adequate wiring	Negligible
With poor wiring and overloading of circuits	5–20
Luminaire Light Absorption	18–35
Paint Depreciation	
Absorption of light by walls, ceilings, floors and other surfaces	5 (per year)
Dirt and Dust Depreciation	
1-month cleaning intervals	10
3-month cleaning intervals	15
6-month cleaning intervals	20
Cleaned when lamps burn out	30
Lamp Outage Depreciation	Up to 12

TYPES OF MAINTENANCE EQUIPMENT
Used for Lighting Servicing

Equipment	Mounting Height (Feet)			
	To 12	12–18	18–30	Over 30
Catwalk (Or Truss)			X	X
Crane (Where Available)			X	X
Crows-Nest Ladder			X	
Disconnecting Hanger		X	X	X
Portable Maintenance Platform		X	X	
Relamping Bridge			X	X
Step Ladder	X			
Straight Ladder		X		
Telescoping Platform Tower		X	X	

LIGHT SOURCE EFFICIENCIES

Source	Approx Lumens per Watt*
Candle (luminous efficiency equivalent)	0.1
Oil lamp (luminous efficient equivalent)	0.3
Original incandescent lamp (1879)	1.4
60-watt carbon filament lamp (1905)	4.0
60-watt coiled coil tungsten filament lamp (1954)	13.9
1000-watt general service lamp (1959)	23.0
No. 1 photoflood lamp (1959)	34.4
1000-watt Type H12KP (ASA) mercury vapor lamp (1958)	58.0
40-watt cool white fluorescent lamp, lamp only (1959)	77.5

*Initial value, lamp only

LIGHTING DESIGN AND LAYOUT DATA (continued)

COEFFICIENTS OF UTILIZATION FOR TYPICAL LUMINAIRES

Luminaire Type	Distribution and Maximum Spacing	Ceiling / Walls Room Ratio	80%		50%	
			50%	30%	50%	10%
			Coefficients of Utilization			
Direct Lighting						
1-Lamp Aluminum Troffer Baffled	0% Up 60% Down 0.8 x MH	1.0	.43	.40	.42	.37
		1.5	.50	.47	.49	.44
		2.5	.55	.53	.54	.50
		4.0	.59	.57	.56	.54
3-Lamp 24" Troffer Diffusing Plastic	0% Up 60% Down 0.9 x MH	1.0	.37	.31	.35	.27
		1.5	.45	.40	.43	.35
		2.5	.52	.48	.49	.43
		4.0	.56	.54	.54	.50
Mercury Aluminum High Bay	0% Up 70% Down 0.9 x MH	1.0	.48	.45	.47	.42
		1.5	.57	.53	.55	.50
		2.5	.64	.61	.62	.58
		4.0	.68	.66	.66	.63
Mercury Porcelain High Bay Ventilated	0% Up 75% Down 1.0 x MH	1.0	.50	.46	.49	.42
		1.5	.59	.55	.58	.52
		2.5	.67	.64	.66	.61
		4.0	.74	.70	.71	.67
Mercury Prismatic High Bay	0% Up 70% Down 0.6 x MH	1.0	.67	.63	.64	.60
		1.5	.73	.70	.69	.65
		2.5	.78	.75	.74	.70
		4.0	.81	.79	.76	.74
Semi-Direct Lighting						
4-Lamp Enclosed Diffusing Plastic	10% Up 50% Down 1.0 x MH	1.0	.27	.23	.25	.19
		1.5	.34	.30	.30	.25
		2.5	.40	.37	.36	.32
		4.0	.45	.41	.40	.36
2-Lamp Porcelain Industrial Reflector	10% Up 70% Down 1.0 x MH	1.0	.47	.41	.45	.36
		1.5	.60	.54	.56	.48
		2.5	.71	.65	.66	.59
		4.0	.78	.74	.73	.67
2-Lamp Bare Lamp Channel	10% Up 80% Down 1.0 x MH	1.0	.46	.38	.42	.33
		1.5	.58	.51	.53	.44
		2.5	.69	.63	.64	.55
		4.0	.77	.72	.71	.64
Direct – Indirect Lighting						
Multilamp Metal Panels and Louvers	30% Up 35% Down 1.1 x MH	1.0	.31	.27	.28	.22
		1.5	.37	.33	.32	.27
		2.5	.44	.41	.39	.34
		4.0	.50	.47	.42	.39
2-Lamp Metal Sides Louver Shielding	45% Up 35% Down 1.2 x MH	1.0	.37	.30	.32	.24
		1.5	.46	.40	.38	.31
		2.5	.57	.51	.47	.40
		4.0	.63	.59	.51	.45

COEFFICIENTS OF UTILIZATION FOR TYPICAL LUMINAIRES

Luminaire Type	Distribution and Maximum Spacing	Ceiling Walls Room Ratio	80%		50%	
			50%	30%	50%	10%
			Coefficients of Utilization			
Semi-Indirect Lighting						
4-Lamp Translucent Sides and Bottom	60% Up 15% Down 1.2 x MH	1.0	.26	.20	.19	.12
		1.5	.36	.30	.25	.18
		2.5	.46	.40	.32	.25
		4.0	.54	.50	.37	.32
Fluorescent Grid Luminous Indirect	65% Up 10% Down 1.2 x MH	1.0	.27	.21	.20	.13
		1.5	.37	.30	.26	.19
		2.5	.48	.42	.33	.26
		4.0	.56	.51	.38	.33
Indirect Lighting						
Luminous Indirect Fluorescent	65% Up 5% Down 1.2 x MH	1.0	.19	.14	.13	.07
		1.5	.26	.20	.18	.12
		2.5	.35	.30	.24	.18
		4.0	.39	.37	.27	.23
Silvered Bowl Indirect	85% Up 0% Down 1.2 x MH	1.0	.24	.16	.17	.08
		1.5	.35	.26	.23	.13
		2.5	.48	.40	.29	.21
		4.0	.57	.52	.36	.29
Fluorescent Cove Without Reflector	Cove 12" to 18" Below Ceiling	1.0	.18	.15	.10	.07
		1.5	.25	.21	.15	.11
		2.5	.33	.30	.20	.17
		4.0	.36	.34	.22	.20
Luminous Ceiling Lighting						
Extended area system using diffusing glass or plastic. Ceiling cavity reflectance 75%		1.0	.31	.26	–	–
		1.5	.40	.35	–	–
		2.5	.49	.46	–	–
		4.0	.56	.54	–	–
Extended area system using opaque white louvers. Ceiling cavity reflectance 75%		1.0	.25	.22	–	–
		1.5	.30	.26	–	–
		2.5	.33	.31	–	–
		4.0	.35	.34	–	–

* Above CU values are based on floor of 10% reflectance.
Increase all CU values by percentages shown below for floors having 30% reflectance.

Percentage increase for floors having 30% reflectance as compared with 10% reflectance	1.0	5%	3%	4%	1%
	1.5	7%	6%	5%	2%
	2.5	10%	8%	7%	4%
	4.0	14%	12%	8%	6%

NOTE: Coefficients of Utilization shown above here were condensed from Fig. 9–3, IES Lighting Handbook – 3rd Edition, covering popular types of luminaires only. CU values are shown for four roomratios only (1.0, 1.5, 2.5 and 4.0). Interpolate for other room ratios, or refer to manufacturers' complete CU data for specific luminaires when greater accuracy is required.

HEAT LOSS FACTORS

To adjust these factors for insulation, see Figs. 16–20.

FIG. 1. FRAME FLOORS (Heat flow down)

TRANSMISSION HEAT LOSS (Watts per sq ft per deg F temp diff)

Type of ceiling below joists*	Type of floor above joists: Wood subfloor (25/32 in.) and felt plus: Cement (1½ in.) and ceramic tile (½ in.)	Hardwood floor (¾ in.)	Plywood (⅜ in.) and floor tile or linoleum (⅜ in.)	Insulating board (⅜ in.) and hardboard (¼ in.) and floor tile or linoleum (⅜ in.)
No ceiling below; bottom of joists exposed to basement or crawl space	.091	.082	.079	.072
Metal lath and plaster (¾ in.)	.064	.060	.058	.054
Gypsum board (⅜ in.)	.061	.057	.056	.052
Wood lath and plaster	.060	.056	.055	.051
Gypsum lath (⅜ in.) and plaster	.060	.056	.055	.051
Insulating board (½ in.)	.050	.047	.046	.043
Insulating board lath (½ in.) and plaster	.049	.046	.045	.043
Acoustical tile (¾ in.) on wood furring	.047	.045	.044	.041
Acoustical tile (¾ in.) on gypsum board (⅜ in.)	.045	.042	.041	.039

* Plaster assumed of sand-aggregate, ½-in. thick, unless otherwise specified.

FIG. 2. CONCRETE FLOORS (Heat flow down)

TRANSMISSION HEAT LOSS (Watts per sq ft per deg F temp diff)

Concrete deck (inches)	Type of finish floor above slab	No finish ceiling; bare concrete slab	Ceiling applied directly to concrete slab: Plaster (⅛ in.)	Acoustical tile: ½ in.	Acoustical tile: ¾ in.	Ceiling suspended below slab: Gypsum board (⅜ in.): Without plaster	With plaster (¾ in.)	Metal lath and plaster (¾ in.)	Acoustical tile: On furring or channels: ½ in.	On furring or channels: ¾ in.	On gypsum board (⅜ in.): ½ in.	On gypsum board (⅜ in.): ¾ in.
4 to 6	Bare slab; no finish floor above	.131	.130	.086	.073	.077	.075	.081	.064	.056	.059	.053
	Floor tile or linoleum (⅛ in.) or ceramic tile on terrazzo (1 in.)	.128	.127	.085	.072	.076	.075	.080	.062	.054	.058	.052
	Wood block (13/16 in.)	.098	.098	.071	.062	.065	.064	.068	.054	.049	.051	.047
	Wood subfloor (25/32 in.), felt and hardwood (¾ in.) on sleepers	.061	.061	.049	.045	.046	.045	.048	.041	.038	.039	.036
8 to 10	Bare slab; no finish floor above	.115	.114	.079	.068	.071	.070	.075	.058	.053	.056	.050
	Floor tile or linoleum (⅛ in.) or ceramic tile on terrazzo (1 in.)	.113	.112	.078	.067	.071	.069	.074	.058	.052	.055	.050
	Wood block (13/16 in.)	.089	.089	.066	.058	.061	.059	.063	.051	.048	.049	.044
	Wood subfloor (25/32 in.), felt and hardwood (¾ in.) on sleepers	.057	.057	.047	.043	.044	.043	.045	.039	.036	.037	.035

FIG. 3. CONCRETE CEILINGS (Heat flow up)

TRANSMISSION HEAT LOSS (Watts per sq ft per deg F temp diff)

Concrete deck (inches)	Type of finish floor above slab	No finish ceiling; bare concrete slab	Ceiling applied directly to concrete slab: Plaster (⅛ in.)	Acoustical tile: ½ in.	Acoustical tile: ¾ in.	Ceiling suspended below slab: Gypsum board (⅜ in.): Without plaster	With plaster (¾ in.)	Metal lath and plaster (¾ in.)	Acoustical tile: On furring or channels: ½ in.	On furring or channels: ¾ in.	On gypsum board (⅜ in.): ½ in.	On gypsum board (⅜ in.): ¾ in.
4 to 6	Bare slab; no finish floor above	.181	.179	.101	.086	.105	.102	.113	.082	.069	.074	.064
	Floor tile or linoleum (⅛ in.) or ceramic tile on terrazzo (1 in.)	.175	.173	.102	.085	.103	.100	.110	.079	.068	.073	.064
	Wood block (13/16 in.)	.124	.123	.083	.071	.083	.081	.088	.067	.059	.062	.055
	Wood subfloor (25/32 in.), felt and hardwood (¾ in.) on sleepers	.070	.070	.056	.049	.055	.053	.057	.047	.043	.045	.041
8 to 10	Bare slab; no finish floor above	.151	.149	.094	.079	.094	.092	.100	.074	.064	.068	.060
	Floor tile or linoleum (⅛ in.) or ceramic tile on terrazzo (1 in.)	.147	.146	.092	.078	.093	.090	.099	.073	.064	.067	.060
	Wood block (13/16 in.)	.109	.108	.076	.066	.076	.074	.080	.062	.057	.058	.052
	Wood subfloor (25/32 in.), felt and hardwood (¾ in.) on sleepers	.065	.065	.052	.047	.052	.051	.054	.045	.041	.043	.039

FIG. 4. MASONRY WALLS (Heat flow outward)

TRANSMISSION HEAT LOSS (Watts per sq ft per deg F temp diff)

Interior finish*	Exterior finish																	
	Face brick (4 in.) or stone (4 in.) or precast concrete (4 to 6 in.) plus									Common brick (4 in.) or precast concrete (8 in.) plus								
	Concrete block backing			Hollow clay tile backing			Concrete backing			Concrete block backing			Hollow clay tile backing			Concrete backing		
	Thickness of backing (inches)									Thickness of backing (inches)								
	4	8	12	4	8	12	4	8	12	4	8	12	4	8	12	4	8	12
Bare masonry wall; no interior finish	.143	.120	.112	.120	.092	.077	.177	.161	.148	.123	.106	.100	.106	.084	.071	.147	.137	.127
Plaster (⅝ in.) applied directly to masonry	.136	.115	.108	.115	.089	.075	.166	.152	.140	.117	.102	.096	.102	.081	.069	.140	.130	.121
Metal lath and plaster (¾ in.) on furring	.093	.083	.079	.083	.069	.060	.106	.100	.096	.084	.076	.073	.076	.064	.056	.095	091	.086
Gypsum lath (⅜ in.) on furring	.088	.079	.075	.079	.066	.058	.100	.095	.090	.080	.072	.070	.072	.061	.054	.090	.086	.082
Wood lath or gypsum lath (⅜ in.) and plaster on furring	.086	.077	.074	.077	.065	.057	.097	.092	.088	.078	.071	.068	.071	.060	.053	.087	.083	.080
Insulating board lath (½ in.) and plaster on furring	.065	.060	.058	.060	.052	.047	.071	.068	.066	.061	.056	.054	.056	.049	.044	.066	.064	.062

FIG. 5. FRAME CEILINGS (Heat flow up)

TRANSMISSION HEAT LOSS (Watts per sq ft per deg F temp diff)

Type of ceiling below joists*	No floor above. Top of joists exposed to ventilated attic space	Type of floor above joists				
		Wood subfloor only (25/32 in.)	Wood subfloor (25/32 in.) and felt plus			
			Cement (1½ in.) and ceramic tile (½ in.)	Hardwood floor (¾ in.)	Plywood (⅝ in.) and floor tile or linoleum (⅛ in.	Insulating board (⅜ in.) and hardboard (¼ in.) and floor tile or linoleum (⅛ in.)
Metal lath and plaster (¾ in.)	.217	.092	.082	.075	.072	.066
Gypsum board (⅜ in.)	.190	.087	.078	.071	.069	.063
Wood lath and plaster	.181	.085	.076	.070	.068	.062
Gypsum lath (⅜ in.) and plaster	.180	.085	.076	.070	.068	.062
Insulating board (½ in.)	.111	.065	.060	.056	.055	.051
Insulating board lath (½ in.) and plaster	.107	.064	.059	.055	.054	.050
Acoustical tile (¾ in.) on furring	.098	.061	.056	.053	.051	.048
Acoustical tile (¾ in.) on gypsum board (⅜ in.)	.088	.057	.053	.050	.049	.046

FIG. 6. FRAME WALLS (Heat flow outward)

TRANSMISSION HEAT LOSS (Watts per sq ft per deg F temp diff)

Interior finish*	Exterior finish**														
	Wood siding, wood shingles, or wood panels					Wood shingles with insulated backer board or asphalt insulating siding					Brick veneer or plywood (⅜ in.)				
	Sheathing					Sheathing					Sheathing				
	Plywood	Gypsum board	Wood	Insulating board		Plywood	Gypsum board	Wood	Insulating board		Plywood	Gypsum board	Wood	Insulating board	
				½ in.	1 in.				½ in.	1 in.				½ in.	1 in.
Metal lath and plaster (¾ in.)	.092	.091	.077	.072	.061	.081	.080	.069	.065	.056	.105	.103	.086	.079	.066
Gypsum board (⅜ in.) or plywood (¼ in.)	.087	.086	.073	.069	.059	.075	.074	.064	.061	.053	.099	.097	.081	.076	.064
Wood lath or gypsum lath (⅜ in.) and plaster	.085	.084	.072	.067	.058	.073	.072	.063	.059	.052	.096	.094	.079	.074	.062
Wood panels (¾ in.)	.074	.073	.063	.060	.052	.065	.064	.057	.054	.047	.082	.080	.069	.065	.056
Insulating board lath (½ in.) and plaster	.064	.064	.056	.054	.047	.057	.057	.051	.049	.043	.071	.070	.061	.058	.050

* Plaster assumed of sand-aggregate, ½-in. thick, unless otherwise specified.

** Sheathing details: Gypsum ½"; Plywood 5/16"; Wood 25/32" plus building paper; Insulating Board 25/32". Furring strips 1" thick are assumed between wood shingles and gypsum, plywood and insulating board.

HEAT LOSS FACTORS

FIG. 7. HEAT LOSS CONVERSION TABLE

Btu per hr	Watts	Btu per hr	Watts	Btu per hr	Watts	Btu per hr	Watts	Btu per hr	Watts
.01	.0029	.21	.062	.41	.120	.61	.179	.81	.237
.02	.0059	.22	.064	.42	.123	.62	.182	.82	.240
.03	.0088	.23	.067	.43	.126	.63	.185	.83	.243
.04	.0117	.24	.070	.44	.129	.64	.188	.84	.246
.05	.0146	.25	.073	.45	.132	.65	.190	.85	.249
.06	.0176	.26	.076	.46	.135	.66	.193	.86	.252
.07	.0205	.27	.079	.47	.138	.67	.196	.87	.255
.08	.0234	.28	.082	.48	.141	.68	.199	.88	.258
.09	.0264	.29	.085	.49	.144	.69	.202	.89	.261
.10	.029	.30	.088	.50	.146	.70	.205	.90	.264
.11	.032	.31	.091	.51	.149	.71	.208	.91	.267
.12	.035	.32	.094	.52	.152	.72	.211	.92	.270
.13	.038	.33	.097	.53	.155	.73	.214	.93	.272
.14	.041	.34	.100	.54	.158	.74	.217	.94	.275
.15	.044	.35	.103	.55	.161	.75	.220	.95	.278
.16	.047	.36	.105	.56	.164	.76	.223	.96	.281
.17	.050	.37	.108	.57	.167	.77	.226	.97	.284
.18	.053	.38	.111	.58	.170	.78	.229	.98	.287
.19	.056	.39	.114	.59	.173	.79	.231	.99	.290
.20	.059	.40	.117	.60	.176	.80	.234	1.00	.293

FIG. 8. INFILTRATION

(Watts per cu ft per deg F temp diff)

½ air change per hr	1 air change per hr	2 air changes per hr
.0027	.0053	.0106

FIG. 9. HOLLOW GLASS BLOCKS

(Heat flow horizontal)

TRANSMISSION HEAT LOSS (watts per sq ft per deg F temp diff)

Nominal size (inches)	Undivided cavity	With glass fiber dividing cavity
6 x 6 x 4 thick	.176	—
8 x 8 x 4 thick	.165	.141
12 x 12 x 4 thick	.153	.129

FIG. 10. CONCRETE FLOOR SLABS*

(Unheated)

TRANSMISSION HEAT LOSS (Watts per ft of exposed edge)

Outdoor design temperature (deg F)	Edge insulation thickness (inches)**	
	1	2
−20 to −30	16	14.5
−10 to −20	14.5	13
0 to −10	13.5	12

* At or near grade level

** Insulation should extend 24 in. horizontally under slab; or 24 in. down along the foundation wall below slab level.

FIG. 11. BASEMENT WALLS AND FLOORS

(Below grade)*

TRANSMISSION HEAT LOSS** (Watts per sq ft)

Ground water temperature (deg F)	Walls	Floors
40	1.76	0.88
50	1.17	0.59
60	0.59	0.29

* Representative concrete or concrete block construction

** Based on 70F indoor design temperature

FIG. 12.
BASEMENT WALLS
(Above grade)

TRANSMISSION HEAT LOSS (Watts per sq ft per deg F temp diff)

Wall thickness (in.)	Concrete (sand aggregate)	Concrete block (Three oval core)	
		Cinder aggregate	Sand and gravel aggregate
8	.197	.114	.150
10	.178	—	—
12	.162	.107	.138

FIG. 13.
SKYLIGHTS
(Heat flow up)

TRANSMISSION HEAT LOSS (Watts per sq ft per deg F temp diff)

Type of sash	Single glass	Two sheets of glass		
		¼-in. air space	½-in. air space	1-in. or more air space
Large sheets of glass; no sash	.410	.205	.194	.185
Wood*	.370	.185	.174	.1oo
Steel*	.410	.206	.194	.185
Aluminum*	.451	.226	.212	.203

* 80% glass, 20% sash

FIG. 14.
WINDOWS
(Heat flow horizontal)

TRANSMISSION HEAT LOSS (Watts per sq ft per deg F temp diff)

Type of sash	Single glass	Unit-type double glazing**		Single glass with storm sash	
		¼-in. air space	½-in. air space	½-in. air space	1-in. or more air space
Large sheets; no sash	.331	.179	.161	.161	.155
Wood*	.299	.161	.153	.147	.141
Steel*	.331	.179	.194	.161	.155
Aluminum*	.365	.197	.210	.179	.170

* Windows assumed 80% glass, 20% sash
** Sealed units; two panes in same opening

FIG. 15.
SOLID WOOD DOORS
(Heat flow outward)

TRANSMISSION HEAT LOSS (Watts per sq ft per deg F temp diff)

Door thickness (in.)		Exposed door	With glass storm door
Nominal	Actual		
Thin panel*	—	.249	.114
1	25/32	.188	.108
1 1/4	1 1/16	.161	.100
1 1/2	1 5/16	.144	.094
1 3/4	1 3/8	.141	.091
2	1 5/8	.126	.082
2 1/2	2 1/8	.105	.076
3	2 5/8	.091	.067

* Thin wood panel or single panes of glass

CORRECTION OF HEAT-LOSS FACTORS FOR FIBROUS INSULATION

How to Use Curves:

1. Locate "Heat-Loss Factor Without Insulation on left-hand scales.
2. Line up ruler with same factor on right-hand scales and mark appropriate curve where it is crossed by the ruler.
3. Place ruler vertically through mark and read "Heat-Loss Factor With Insulation" on bottom (or top) scales.

FIG. 16. CEILINGS, FLOORS AND WALLS

Insulation completely fills joist or stud space.

Two sets of curves are given: one for constructions where the insulation only partially fills the space between framing members, leaving a resultant air space at least ¾ in. wide, and the other for constructions where the insulation completely fills the space. The latter curves compensate for the loss of the air space. (For ceilings without a floor on the top side of the joists and for floors without a ceiling on the underside of the joists, Fig. 16 should be used.)

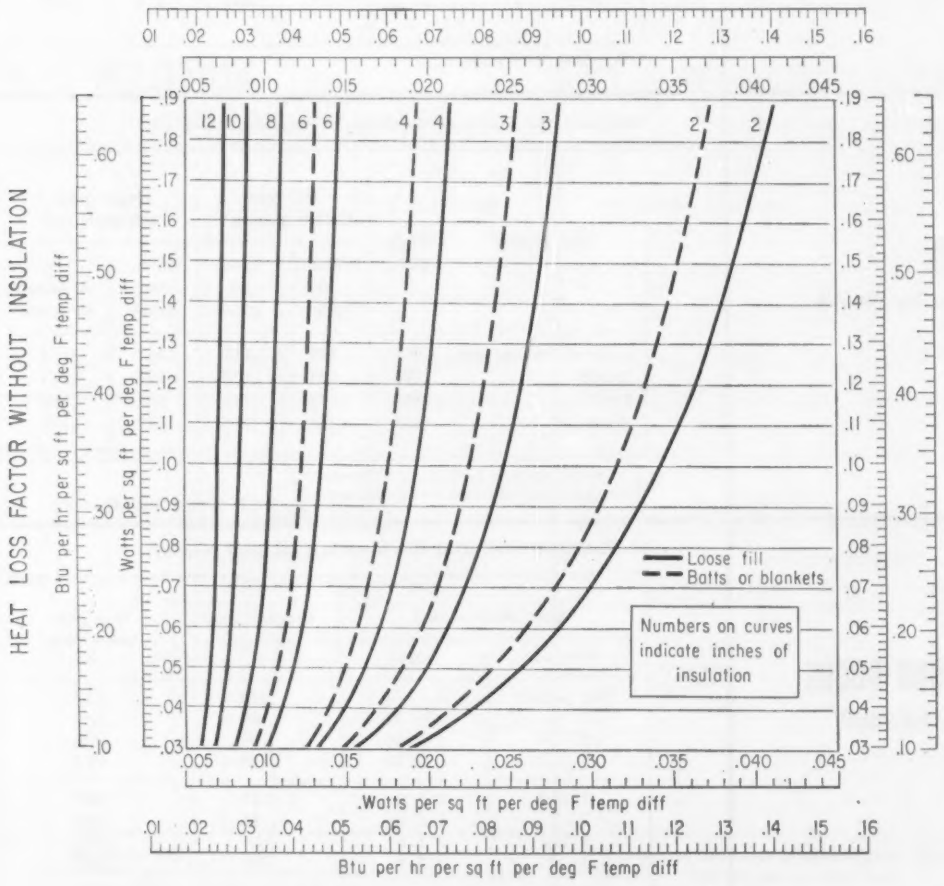
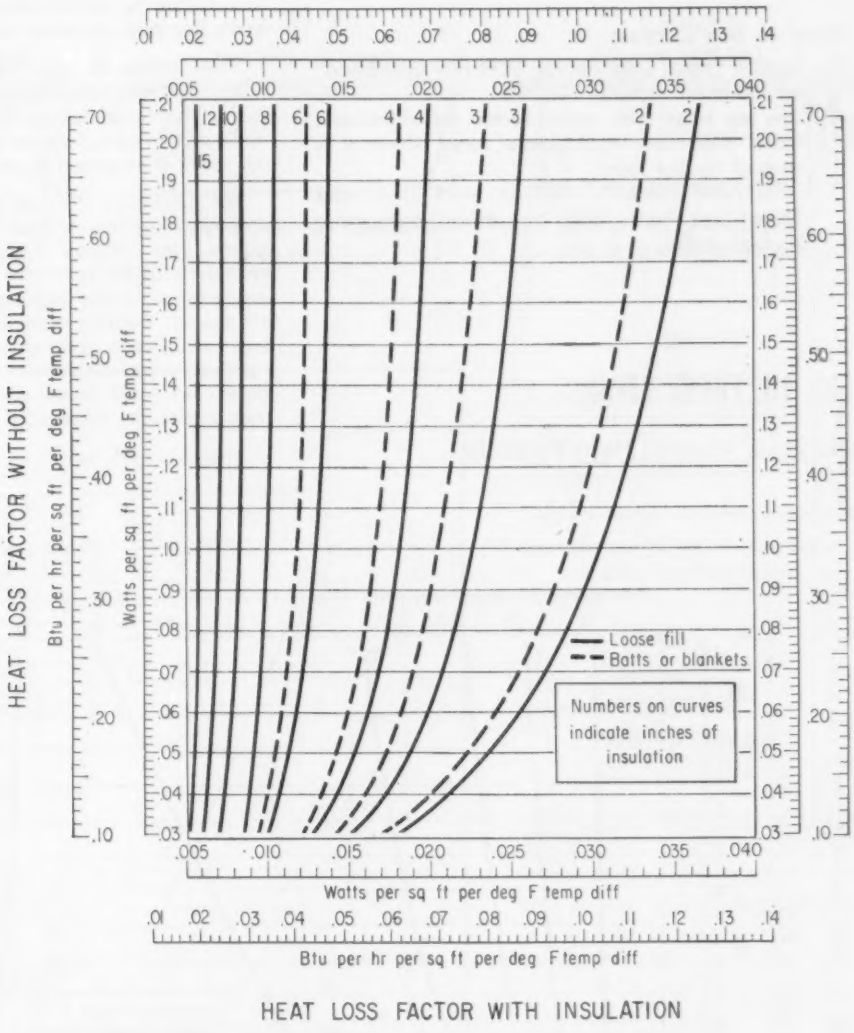

HEAT LOSS FACTOR WITHOUT INSULATION
Btu per hr per sq ft per deg F temp diff
Watts per sq ft per deg F temp diff
12 10 8 6 6 4 4 3 3 2 2
Loose fill
Batts or blankets
Numbers on curves indicate inches of insulation
.Watts per sq ft per deg F temp diff
Btu per hr per sq ft per deg F temp diff
HEAT LOSS FACTOR WITH INSULATION

FIG. 17. CEILINGS, FLOORS AND WALLS

Insulation partially fills joist or stud space.


HEAT LOSS FACTOR WITHOUT INSULATION
Btu per hr per sq ft per deg F temp diff
Watts per sq ft per deg F temp diff
Loose fill
Batts or blankets
Numbers on curves indicate inches of insulation
Watts per sq ft per deg F temp diff
Btu per hr per sq ft per deg F temp diff
HEAT LOSS FACTOR WITH INSULATION

Curves are based on insulation conductivities of .27 and .30 Btu per hr per sq ft per deg TD for each inch of thickness for batts or blankets and loose fill, respectively. For thicknesses up to 6 in., curves are given for both batts or blankets (dashed curves) and loose fill (solid curves), since both types are available and in common use. Heat-loss scales are given both in terms of watts and Btu's to suit the familiarity of the user.

These curves may also be used for masonry walls faced with studs on the inside.

Where air spaces are involved, slight discrepancies may be introduced by applying the same curves to wall, floor and ceiling constructions due to the variation in insulating effect of the air spaces with direction of heat flow. However, such discrepancies will probably have less effect on the overall result than variations introduced during construction.

CORRECTION OF HEAT-LOSS FACTORS FOR REFLECTIVE INSULATION

How to Use Curves:

1. Locate "Heat-Loss Factor Without Insulation" on left-hand scales.
2. Line up ruler with same factor on right-hand scales and mark appropriate curve where it is crossed by the ruler.
3. Place ruler vertically through mark and read "Heat-Loss Factor With Insulation" on bottom (or top) scales.

It is assumed that the reflective material fastened to the tops of ceiling joists is exposed to an unheated attic space; that the material on the underside of the floor joists is exposed to an unheated basement or crawl space.

The effect of floor construction on the overall heat loss factor is slight; therefore only one factor is given for each air-space combination.

The curves of Fig. 18 were plotted from data given in Table 16A, Chapter 9, 1959 *Heating Ventilating Air Conditioning Guide*. They apply to frame walls or furred-out masonry walls, provided that each air space is at least ¾ in. wide.

The insulating effect of reflective air spaces varies with the direction of heat flow, the thickness of the spaces, the overall temperature difference, the emissivity of the reflecting material, and the relative conductance of the building materials bounding the air spaces; therefore no single set of correction factors can hope to account for all variables. However, reasonable variations from the conditions assumed in these charts will change the results probably no more than variations introduced during construction.

FIG. 18. FRAME CEILINGS

No Floor Above; Heat Flow Up

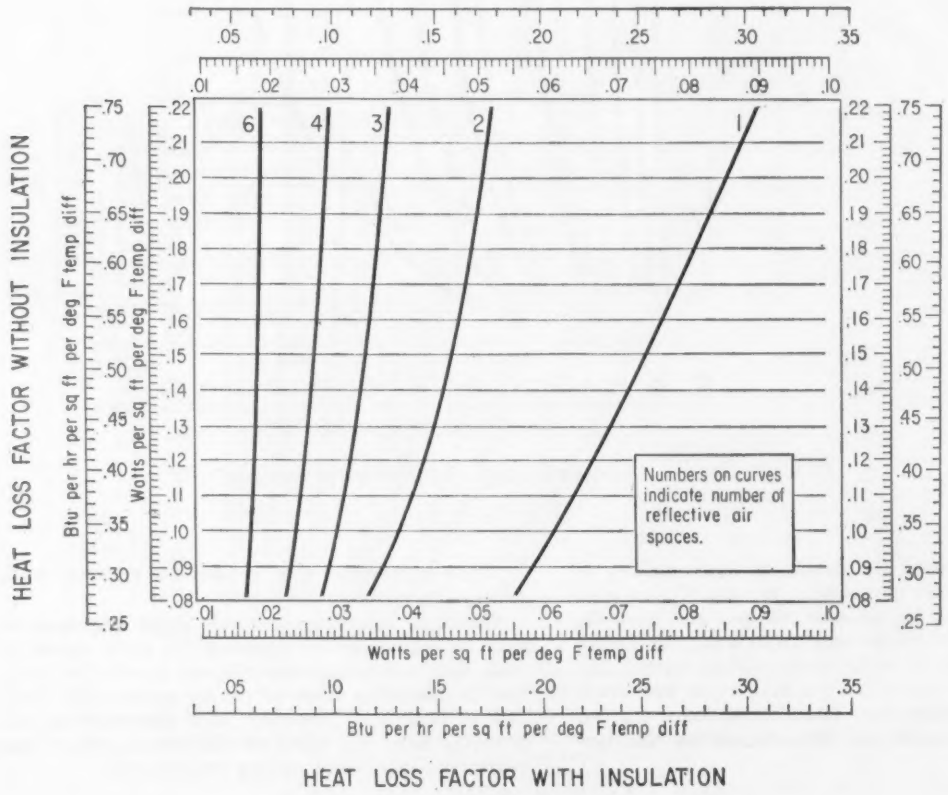
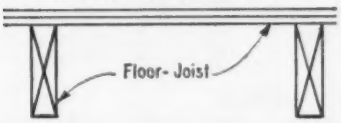

HEAT LOSS FACTOR WITHOUT INSULATION
Btu per hr per sq ft per deg F temp diff
Watts per sq ft per deg F temp diff
.05 .10 .15 .20 .25 .30 .35
.01 .02 .03 .04 .05 .06 .07 .08 .09 .10
.75 .70 .65 .60 .55 .50 .45 .40 .35 .30 .25
.22 .21 .20 .19 .18 .17 .16 .15 .14 .13 .12 .11 .10 .09 .08
6
4
3
2
1
Numbers on curves indicate number of reflective air spaces.
Watts per sq ft per deg F temp diff
Btu per hr per sq ft per deg F temp diff
HEAT LOSS FACTOR WITH INSULATION

FIG. 19. FRAME FLOORS No Ceiling Below; Heat Flow Down

Reflective both sides — Effective emissivity = .05
Reflective one side only — Temperature difference = 70 F

UNINSULATED

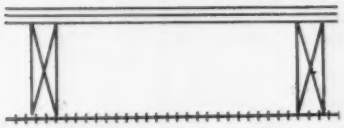
.072-.091 Watt (.24-.31 Btu)



(A) Factors shown represent range for common constructions

1 SPACE

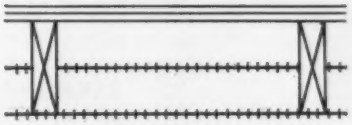
.024 Watt (.082 Btu)



(B) Sheet of aluminum fastened to underside of joists

2 SPACES

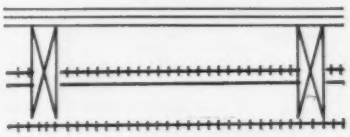
.012 Watt (.041 Btu)



(C) Same as "B", with additional sheet at midpoint of joists

3 SPACES

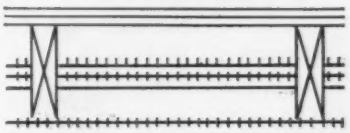
.011 Watt (.037 Btu)



(D) Same as "B", with 2-sheet aluminum-paper assembly centered on joists

4 SPACES

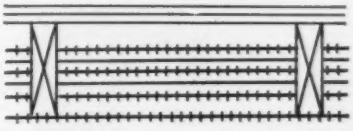
.0098 Watt (.034 Btu)



(E) Same as "D", but with 3-sheet assembly centered in space between joists

6 SPACES

.0078 Watt (.027 Btu)



(F) Same as "D", but with 5-sheet assembly centered in space between joists

FIG. 20. WALLS Heat Flow Horizontal

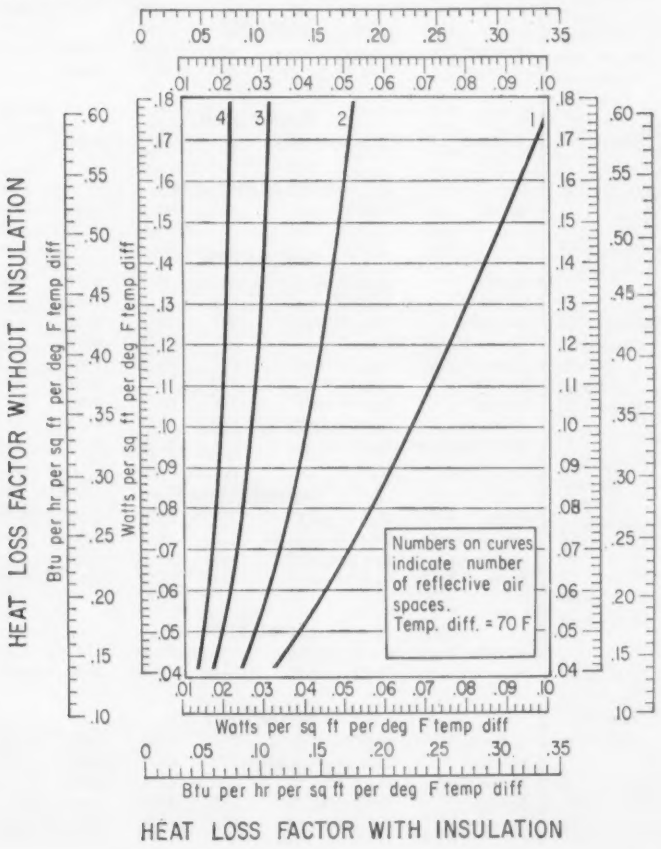

HEAT LOSS FACTOR WITHOUT INSULATION
Btu per hr per sq ft per deg F temp diff
Watts per sq ft per deg F temp diff
0 .05 .10 .15 .20 .25 .30 .35
.01 .02 .03 .04 .05 .06 .07 .08 .09 .10
.60 .55 .50 .45 .40 .35 .30 .25 .20 .15 .10
.18 .17 .16 .15 .14 .13 .12 .11 .10 .09 .08 .07 .06 .05 .04
4
3
2
1
Numbers on curves indicate number of reflective air spaces.
Temp. diff. = 70 F
Watts per sq ft per deg F temp diff
Btu per hr per sq ft per deg F temp diff
HEAT LOSS FACTOR WITH INSULATION

FIG. 21. CLIMATIC DATA—U.S. CITIES

Asterisks indicate airport stations; others are city office stations.
Average temperature = 65—(degree-days/heating days).

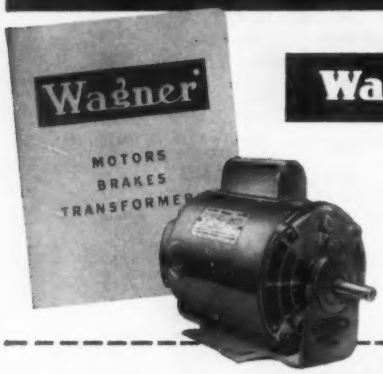
Location	Heating Season	Heating Days	Ave. Mean Temp, F	Degree-Days	Outside Design Temp, F
ALABAMA					
Anniston*	Oct 15–Apr 24	192	50.3	2820	12
Birmingham*	Oct 15–Apr 25	193	50.6	2780	12
Mobile	Nov 2–Apr 1	151	54.9	1529	22
Montgomery	Oct 25–Apr 10	168	53.4	1954	18
ARIZONA					
Flagstaff*	Aug 12–Jul 5	328	42.1	7525	− 4
Phoenix	Nov 5—Apr 2	149	55.0	1492	36
Yuma	Nov 15–Mar 7	113	56.6	951	38
ARKANSAS					
Fort Smith*	Oct 16–Apr 20	187	48.0	3188	6
Little Rock*	Oct 17–Apr 21	187	49.1	2982	8
CALIFORNIA					
Eureka	.....	365	52.3	4632	32
Fresno*	Oct 16–Apr 25	192	51.8	2532	32
Independence	Sept 25–May 23	241	49.1	3832	12
Los Angeles	Nov 2–May 10	190	57.4	1451	41
Sacramento	Oct 16–May 14	211	52.7	2600	30
San Diego*	Oct 22–Jun 2	224	58.0	1574	43
San Francisco	.....	365	56.6	3069	37
San Jose	Oct 7–Jun 7	244	55.1	2410	38
COLORADO					
Denver	Sept 15–Jun 7	266	43.7	5673	−12
Grand Junction*	Sept 25–May 23	241	41.0	5796	− 3
Pueblo*	Sept 17–May 31	257	42.8	5709	−14
CONNECTICUT					
Bridgeport*	Sept 19–Jun 5	260	42.3	5896	− 1
Hartford*	Sept 12–Jun 2	264	41.7	6139	− 2
New Haven*	Sept 14–Jun 8	268	42.5	6026	0
DELAWARE					
Wilmington*	Sept 27–May 19	235	44.1	4910	0
DISTRICT OF COLUMBIA					
Washington	Oct 2–May 12	223	45.9	4258	10
FLORIDA					
Jacksonville	Nov 10–Mar 21	132	56.6	1113	28
Miami	Dec 4–Mar 13	100	63.3	173	35
Pensacola	Nov 3–Apr 2	151	55.5	1435	24
Tampa*	Dec 1–Mar 3	93	57.8	674	36
GEORGIA					
Atlanta	Oct 14–Apr 25	194	50.5	2811	11
Augusta*	Oct 23–Apr 12	172	52.6	2138	20
Macon*	Oct 23–Apr 9	169	52.9	2049	20
Savannah*	Oct 28–Apr 9	164	54.6	1710	24
IDAHO					
Boise*	Sept 9–Jun 12	277	43.7	5890	−10
Lewiston*	Sept 13–Jun 8	269	44.6	5483	−12
Pocatello*	Sept 4–Jun 20	290	40.9	6976	−17
ILLINOIS					
Cairo	Oct 11–Apr 29	201	46.3	3756	0
Chicago*	Sept 21–May 29	251	39.9	6310	−11
Peoria*	Sept 22–May 27	248	40.5	6087	−13
INDIANA					
Evansville*	Oct 4–Jun 15	255	47.9	4360	− 4
Fort Wayne*	Sept 18–May 30	255	40.3	6287	− 7
Indianapolis	Oct 2–May 18	229	42.6	5134	− 8
Terre Haute*	Sept 28–May 20	235	42.2	5366	− 6
IOWA					
Charles City	Sept 10–May 31	264	36.6	7504	−21
Davenport	Sept 24–May 21	240	39.6	6091	−12
Des Moines	Sept 23–May 23	243	39.2	6274	−13
Sioux City*	Sept 16–May 26	253	37.3	7012	−16
KANSAS					
Concordia	Oct 2–May 19	230	41.9	5323	−11
Dodge City	Oct 2–May 20	231	43.1	5058	− 9
Topeka	Oct 4–May 13	222	42.8	4919	− 8
Wichita*	Oct 7–May 14	220	44.2	4571	− 6
KENTUCKY					
Bowling Green*	Oct 4–May 16	225	46.0	4279	2
Lexington*	Oct 1–May 21	233	43.6	4979	− 2
Louisville	Oct 6–May 10	217	45.3	4279	− 2
LOUISIANA					
New Orleans	Nov 10–Mar 24	135	56.3	1175	26
Shreveport*	Oct 26–Apr 6	163	52.0	2117	14
MAINE					
Eastport	.....	365	42.4	8246	− 9
Portland*	Aug 27–Jun 25	303	39.7	7681	− 9
MARYLAND					
Baltimore	Sept 8–May 13	248	48.1	4203	8
MASSACHUSETTS					
Boston*	Sept 17–Jun 5	262	42.9	5791	0
MICHIGAN					
Alpena	Aug 25–Jun 25	305	38.5	8073	−10
Detroit*	Sept 17–Jun 2	259	40.3	6404	− 4
Escanaba	Aug 22–Jun 27	310	37.1	8657	−18
Grand Haven	Aug 31–Jun 19	293	41.4	6915	− 3
Grand Rapids	Sept 16–Jun 2	260	40.1	6474	− 4
Houghton	Aug 9–Jul 6	332	38.0	8964	−18
Lansing*	Sept 9–Jun 3	268	38.9	6982	− 8
Marquette	Aug 24–Jul 1	312	37.7	8529	−16
Sault Ste. Marie*	Aug 8–Jul 15	342	37.3	9475	−19
MINNESOTA					
Duluth	Aug 21–Jul 5	319	35.3	9474	−27
Minneapolis*	Sept 11–May 31	263	35.1	7853	−23
Moorhead	Aug 23–Jun 16	298	34.0	9315	−29
St. Paul*	Sept 11–Jun 1	264	35.4	7804	−23
MISSISSIPPI					
Meridian*	Oct 17–Apr14	180	52.0	2333	14
Vicksburg	Oct 26–Apr 8	165	52.9	2000	15
MISSOURI					
Columbia*	Sept 29–May 17	231	42.9	5113	− 9
Hannibal	Sept 24–May 29	239	43.1	5248	−12
Kansas City*	Oct 5–May 12	220	42.8	4888	− 8
St. Louis	Oct 8–May 10	215	44.2	4469	− 5
Springfield*	Oct 1–May 19	231	44.7	4693	− 5

ELECTRIC SPACE HEATING DATA (continued)

Outside design temperature given is that which is likely to recur once every 13 years as the minimum daily mean temperature.

Location	Heating Season	Heating Days	Ave. Mean Temp, F	Degree-Days	Outside Design Temp, F
MONTANA					
Billings*	Sept 4–Jun 16	286	40.2	7106	−31
Havre	Aug 29–Jun 22	298	37.4	8213	−39
Helena	Aug 20–Jul 3	318	39.4	8126	−39
Kalispell*	Aug 17–Jul 5	323	40.1	8055	−31
Miles City*	Sept 7–Jun 13	280	37.1	7822	−35
NEBRASKA					
Lincoln	Sept 27–May 21	237	40.3	5865	−15
North Platte*	Sept 15–Jun 1	260	39.8	6546	−15
Omaha*	Sept 24–May 20	239	39.2	6160	−17
Valentine	Sept 12–Jun 5	267	38.5	7075	−21
NEVADA					
Reno*	Sept 4–Jun 26	296	44.6	6036	3
Winnemucca*	Sept 4–Jun 17	287	42.8	6369	− 9
NEW HAMPSHIRE					
Concord*	Aug 29–Jun 15	291	38.8	7612	−11
NEW JERSEY					
Atlantic City	Sept 29–May 30	244	45.6	4741	− 8
Elizabeth	Sept 20–May 24	247	43.5	5302	2
New Brunswick	Sept 17–May 30	256	43.9	5404	4
Plainfield	Sept 16–Jun 1	259	43.6	5535	4
Somerville	Sept 18–May 29	254	43.1	5586	2
Trenton	Sept 25–May 21	239	43.8	5068	2
NEW MEXICO					
Albuquerque*	Oct 3—May 12	222	45.2	4389	8
Roswell*	Oct 8–May 3	208	48.5	3424	4
Santa Fe	Sept 1–Jun 15	287	43.9	6063	3
NEW YORK					
Albany	Sept 15–May 28	256	40.3	6319	− 9
Binghamton*	Aug 30–Jun 16	291	39.1	7537	− 7
Buffalo*	Sept 10–Jun 9	273	40.0	6838	− 5
Ithaca	Sept 4–Jun 9	279	40.9	6719	− 4
New York	Sept 28–May 26	241	44.0	5050	5
Oswego	Sept 9–Jun 15	280	40.1	6975	− 7
Rochester*	Sept 9–Jun 6	271	39.7	6863	− 4
Syracuse*	Sept 13–Jun 2	263	40.2	6520	−10
NORTH CAROLINA					
Asheville	Sept 29–May 19	233	47.5	4072	5
Charlotte*	Oct 9–Apr 30	204	49.3	3205	14
Hatteras	Oct 23–May 3	193	52.6	2392	21
Raleigh	Oct 12–May 1	202	49.8	3075	14
Wilmington*	Oct 19–Apr 24	188	52.6	2323	20
NORTH DAKOTA					
Bismarck*	Aug 31–Jun 16	290	33.9	9033	−31
Devils Lake	Aug 27–Jun 22	300	31.9	9940	−32
Grand Forks	Aug 15–Jun 23	313	33.8	9764	−31
Williston	Sept 1–Jun 19	292	33.9	9068	−35
OHIO					
Cincinnati	Oct 4–May 14	223	44.7	4532	− 3
Cleveland	Sept 23–May 29	249	42.0	5717	− 5
Columbus	Sept 27–May 22	238	42.8	5277	− 3
Dayton*	Sept 25–May 25	243	42.0	5597	− 4
Sandusky	Sept 23–May 29	249	41.5	5859	− 4
Toledo*	Sept 16–May 31	258	40.2	6394	− 5
OKLAHOMA					
Oklahoma City	Oct 16–Apr 27	194	46.9	3519	− 1
OREGON					
Baker	Aug 25–Jul 4	314	42.4	7087	−14
Portland	Sept 16–Jun 18	276	50.0	4143	10
Roseburg	Sept 13–Jun 19	280	50.3	4122	19
PENNSYLVANIA					
Erie	Sept 20–Jun 4	258	41.3	6116	− 3
Harrisburg*	Sept 22–May 20	241	43.2	5258	4
Philadelphia	Oct 2–May 17	228	45.2	4523	6
Pittsburgh	Sept 28–May 19	234	43.4	5048	− 3
Reading	Sept 26–May 21	238	43.7	5060	3
Scranton	Sept 15–May 30	258	41.6	6047	− 2
RHODE ISLAND					
Block Island*	Sept 13–Jun 19	280	44.1	5843	7
Providence	Sept 18–Jun 1	257	43.2	5607	1
SOUTH CAROLINA					
Charleston	Oct 28—Apr 10	165	54.3	1769	22
Columbia	Oct 19—Apr 17	181	52.4	2284	19
SOUTH DAKOTA					
Huron*	Sept 12–Jun 3	265	29.8	7902	−21
Pierre	Sept 4–Jun 17	287	39.2	7420	−22
Rapid City*	Sept 5–Jun 17	286	26.3	7535	−22
TENNESSEE					
Chattanooga*	Oct 8–May 4	209	48.8	3384	8
Knoxville*	Oct 8–May 4	209	47.8	3590	5
Memphis	Oct 19–Apr 22	186	48.8	3006	6
Nashville*	Oct 11–May 2	204	47.8	3513	3
TEXAS					
Abilene*	Oct 22–Apr 14	175	49.8	2657	7
Amarillo*	Oct 2–May 17	228	45.9	4345	− 2
Corpus Christi*	Nov 15–Mar 15	121	56.6	1011	23
Dallas*	Oct 27–Apr 6	162	51.0	2272	8
El Paso*	Oct 19–Apr 19	183	50.6	2641	20
Fort Worth*	Oct 27–Apr 10	166	50.8	2361	8
Galveston	Nov 13–Mar 29	137	56.2	1211	23
Houston	Nov 8–Mar 25	138	55.8	1276	19
Palestine	Oct 30–Apr 7	160	52.6	1980	11
San Antonio*	Nov 5–Mar 29	145	54.1	1579	19
UTAH					
Salt Lake City	Sept 20–May 29	252	43.3	5463	− 1
VERMONT					
Burlington*	Sept 3–Jun 10	281	37.0	7865	−17
Northfield	Aug 8–Jul 1	328	38.6	8719	−19
VIRGINIA					
Cape Henry	Oct 12–May 12	213	49.5	3307	17
Lynchburg*	Sept 29–May 12	226	46.6	4153	11
Norfolk	Oct 13–May 7	207	49.9	3119	15
Richmond	Oct 6–May 9	216	47.8	3720	11
Wytheville	Sept 13–Jun 2	263	45.9	5022	3
WASHINGTON					
Seattle*	Aug 28–Jul 2	309	50.6	5275	15
Spokane*	Aug 31–Jun 27	301	42.2	6852	−16
Tacoma	Aug 13–Jul 9	331	50.3	4866	15
Tatoosh Island	.....	365	49.3	5724	18
Walla Walla	Sept 20–May 27	250	45.6	4848	−12
WEST VIRGINIA					
Elkins*	Sept 12–Jun 6	268	43.5	5773	− 4
Parkersburg	Sept 30–May 18	231	44.4	4750	− 1
WISCONSIN					
Green Bay*	Sept 2–Jun 12	284	35.9	8259	−20
La Crosse*	Sept 10–May 31	264	36.0	7650	−20
Madison	Sept 13–Jun 3	264	37.3	7300	−19
Milwaukee	Sept 15–Jun 12	271	39.4	6944	−17
WYOMING					
Cheyenne*	Aug 26–Jun 28	307	40.4	7562	−19
Lander*	Aug 29–Jun 22	298	37.1	8303	−30
Yellowstone Park	.....	365	38.8	9554	−34

Which of these ELECTRIC MOTOR BULLETINS can be helpful to you?

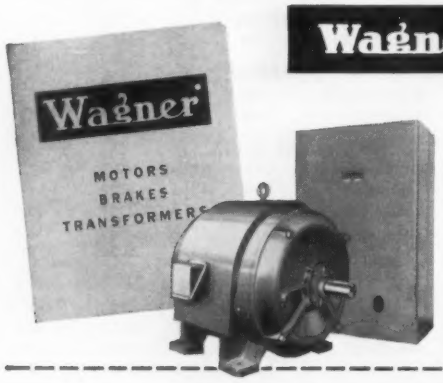


Wagner FRACTIONAL HP MOTORS

Bulletin MU-211. Illustrates and describes both single-phase and polyphase squirrel-cage motors, open and enclosed types; also fan and blower motors and jet pump motors.

Wagner INTEGRAL HP MOTORS

Bulletins MU-212, 213. Cover single-phase ratings through 15 hp, and polyphase squirrel-cage motors through 1000 hp, open and enclosed types; also multispeed, punch press, crane and hoist, and wound rotor polyphase motors.



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Alphabetical listing of company names, trade names and addresses

The following listing contains

1. Company names, with complete addresses.
2. Company trade names, in capital letters for easy reference.
3. Other names by which companies may be or may have been known, cross-referenced to present company.

Trade names are listed solely on the basis of information supplied by the manufacturer and are not guaranteed to be registered or the exclusive property of the manufacturer concerned.

A

A-B—Allen-Bradley Co
A B C—Columbia Cable & Electric Corp
A C Transformer Corp 89 Madison St Newark N J
ACI—American Coils Co
A C L—Columbia Cable & Electric Corp
ACW—American Creosote Works Inc
ADT Co—see American District Telegraph Co
AECO—American Electric Cable Co
AFCO—Alhambra Foundry Co Ltd
AFS—AutoFYRstop Co
AG—Farrelloy Co
A G A Div Elastic Stop Nut Corp of America 1027 Newark Ave Elizabeth N J
A H—Arrow-Hart & Hegeman Electric Co
A J F Industries Inc—see Atlantic Transformer Div
A-MAL-GAM—Smith Welding Equipment Corp
AMCO—American Solder & Flux Co
AMP Inc Eisenhower Blvd Harrisburg Pa
A1 Audio Enigneers—see O'Brien Electric Corp
AOW Corp 450 N Ninth St Elwood Ind
A-P Controls Corp—see Controls Co of America
APAC—Keasbey & Mattison Co
APCO—Aurora Pump Div New York Air Brake Co
A P M—Automatic & Precision Mfg Co
A & R—Air & Refrigeration Corp
A-S—Allen-Stevens Conduit Fittings Corp
ASCO—Automatic Switch Co
ASMC—Farrelloy Co
ATI—Alexander-Tagg Industries Inc
A W H Co—see Haydon (A W) Co
A-Z—Plastic Wire & Cable Corp
ABELCOR—O'Brien Electric Corp
ABOGLAS—Natvar Corp
Abolite Lighting Div Jones Metal Products Co West Lafayette Ohio
ABR-A-SAW—Collins Machinery Corp
Abrams Instrument Corp 606 E Shiawasee St Lansing Mich
Abrams Lighting 785 Schuylkill Ave Philadelphia 46 Pa
ABSORB-A-SHOCK—Federal Shock Mount Corp
ACCOLITE—Accurate Insulated Wire Corp
ACCORDION—Pullman Vacuum Cleaner Corp
ACCPRENE—Accurate Insulated Wire Corp
ACCTHERM—Accurate Insulated Wire Corp
Accurate Engineering Co 2005 Blue Island Ave Chicago 8 Ill
Accurate Insulated Wire Corp 25 Fox St New Haven 13 Conn
Accurate Mfg Co 44 Hepworth Place Garfield N J
ACCWIRE—Accurated Insulated Wire Corp
ACE—Armature Coil Equipment Inc
ACE—Arro Expansion Bolt Co
ACE—Peer Inc
Ace Lighting Products Co 230 Eugenia St S W Atlanta 3 Ga
ACHESON—National Carbon Co
ACHROMATIC—Keystone Electric Mfg Co
ACID-CAUSTIC BAND—Wilbur & Williams Co
Ackerman-Johnson Co 625 W Jackson Blvd Chicago 6 Ill
ACME—Co-operative Utilities Co Inc
ACME—McCaffrey Mfg & Supply Co
Acme Electric Corp 45 Water St Cuba N Y
Acme Electric Heating Corp 99 Reading St Boston 19 Mass
Acme Fire Alarm Company Inc 106 Seventh Ave New York 11 NY
Acme Industries Inc 620 N Mechanic St Jackson Mich
Acme Lighting & Mfg Co 949 E 31 St Los Angeles 11 Calif
Acme Lite Products Co Inc Congers N Y
Acme Mfg & Gasket Co 738 N 41 St Phila 4 Pa
Acme Steel Co 135th St & Perry Ave Chicago 27 Ill
Acme Welded Pipe & Coil Co—see Acme Industries Inc
Acme Wire Co Electrical Utilities Div 1255 Dixwell Ave New Haven Conn
Acorn Insulated Wire Co 36 Freeman St Pawtucket R I
Acoustica Associates Inc 26 Windsor Ave Mineola N Y
ACOUSTILITE—Neo-Ray Products Inc
Acra Electric Corp 9901 Pacific Ave Franklin Park Ill
Acra Industrial Electric Co—see Acra Electric Corp
ACRATROL—Counter & Control Corp
ACRAWATT—Acra Electric Corp
ACRI-LUMINUS—Luminous Ceilings Inc
ACRO-ARC—Acro Welder Mfg Co
ACRO-ETCH—Acromark Co
ACRO-LITE—Acro Switch Div
ACRO-MAGNETIC—Acro Welder Mfg Co
ACRO SWITCH—Acro Switch Div
Acro Mfg Co—see Acro Switch Div
Acro-Mu Switch Div—see Acro Switch Div
Acro Switch Div Robertshaw-Fulton Controls Co 2040 E Main St Columbus 16 Ohio
Acro Welder Mfg Co 1719 W St Paul Ave Milwaukee 3 Wis
Acro Mark Co 320 Morrell St Elizabeth 4 NJ
ACROMATIC—Acro Welder Mfg Co
ACRYLENS—Lightolier Inc
Active Specialty Corp Elm St Walden N Y
ACTOGRAP—Newage Industries Inc
ACUSTI-LUMINUS—Luminous Ceilings Inc
Adalet Mfg Co 14300 Lorain Ave Cleveland 11 Ohio
ADALOY—Adams Engineering Co
Adam (Frank) Electric Co 3647 Windsor Pl St Louis Mo
Adams Engineering Co 31711 Solon Rd Solon Ohio
ADAPT-A-LITE—Cable Electric Products Inc
ADAPT-O-MOUNT—Overly-Hautz Co
ADAPTA-STUD—Tomic Sales & Engineering Co
ADAPTABEL—Edwards Co Inc
ADAPTAHORN—Edwards Co Inc
ADAPTALITE—MiroFlector Co Inc
ADAPTOMATIC—Fedders Corp
Adcrafters Co 325 W Huron St Chicago 10 Ill
ADD-A-Breaker—Westinghouse Electric Corp
ADD-A-CALL—Simpson (Mark) Mfg Co Inc
ADD-A-PHASE—System Analyzer Corp
ADD-A-POINT—Wama Co
ADD-A-SHELF—Alpha Wire Corp
ADD-A-TIER—Bernard-Franklin Co Inc
ADD-A-UNIT—Blonder-Tongue Laboratories Inc
ADDA-STRIP—Garcy Lighting Div
ADDAPLUG—Associated Engineering Corp
ADJUSCO—Adjustable Fixture Co
ADJUSCO-LOC—Adjustable Fixture Co
ADJUST-A-VOLT—Standard Electrical Products Co
ADJUST-ANGLE—Weksler Instrument Corp
ADJUST-O-LITES—Litecraft Mfg Co
ADJUST-O-SPOTS—Litecraft Mfg Co
Adjusta Post Mfg Co 908 St Clair St Akron 7 Ohio
ADJUSTA-PULLEY—Watteredge Co
Adjustable Fixture Co 104 E Mason St Milwaukee 2 Wis
ADJUSTAT—Smith-Gates Corp
ADJUSTO-DECK—Haertel (Walter) Co
ADJUSTO-SLIDE—American Pulley Co
ADJUSTOHM—Ward Leonard Electric Co
Adre Co 8980 W Hawthorne Lane Hales Corners 3 Wis
ADVAN-GUARD—Advance Transformer Co
ADVANCE—Beaver-Advance Corp
ADVANCE—Elgin National Watch Co
Advance Transformer Co 2950 N Western Ave Chicago 18 Ill
ADVENTURER—York Div
Aemco Inc 10 State St Mankato Minn
AERO—American District Telegraph Co
AERO FAN—Emerson-Pryne Co
Aero Instrument Co 11423 Vanowen St North Hollywood Calif
AERO-MAGNETTE—Heinemann Electric Co
AERODYNE—Jeffrey Mfg Co
Aeroil Products Co Inc 69 Wesley St South Hackensack N J
Aerolux Electric Lamp Corp—see Aerolux Lights Corp
Aerolux Lights Corp 653 11th Ave N Y 36 N Y
AEROLYTE—Lightolier Inc
AEROMAC—Seely Instrument Co Inc
Aerovent Fan Co Inc Ash and Block Sts Piqua Ohio
Aetra Motor Products Co—see Pollak (Joseph) Corp
Afco Lite Corp 1378 N Wolcott Chicago 22 Ill
AFTER-GLOW—Perfeclite Co
AGASTAT—A G A Div
AGASWITCH—A G A Div
AGLITES—Guth (Edwin F) Co
AGRIPPA—Williams (J H) & Co
Ahlberg Bearing Co 3025 W 4th St Chicago 32 Ill
AIM BRAND—Acme Steel Co
Ainsworth Lighting Inc 38-10 Twenty-Ninth St LIC 1 NY
AIR CONTROL—Hastings Air Conditioning Co Inc
Air Controls Inc 2310 Superior Ave Cleveland 14 Ohio
AIR-FLOW—Matthews Electric Heater Mfg Co
Air-Hydraulics of Indiana 7769 Lafayette Rd New Augusta Ind
AIR KING—Berns Air King Corp
Air-Marine Motors Inc 369 Bay View Ave Amityville NY
AIR MOVER—Mine Safety Appliances Co
Air & Refrigeration Corp 439 Madison Ave New York City N Y
AIRBOY—Mitchell Industries Inc
Aircraft Marine Products Inc—see AMP Inc
Aircraft Specialties Inc 415 Howard St Lapeer Mich
AIRE-RECTIFIER—Larco Inc
Airfan Engineering Co 7401 Telegraph Rd Los Angeles 22 Calif
AIRLUX—Sun-Lite Mfg Co
AIRMASTER—Haertel (Walter) Co
AIRMPELER—Ammerman Co Inc
AIRSEAL—Kearney (James R) Corp
Airserco Mfg Co Inc 435 Melwood St Pittsburgh 13 Pa
AIRSPREAD—Hunter Div
Airtemp Div Chrysler Corp 1600 Webster St Dayton 1 Ohio
AIRXPELER—Ammerman Co Inc
AJAX—Security Insert Co
AJAX—Sherwin-Williams Co
AJAX-ANKERSEN—Ajax Electric Co
Ajax Electric Co 954 Frankford Ave Phila 23 Pa
Ajax Magnethermic Corp 3990 Simon Rd Youngstown 1 Ohio
AJUSTO-SPEDE—Allis (Louis) Co
AKRA-OHM—Shallcross Mfg Co
ALABAX—Pass & Seymour Inc
ALADDIN—New England Carbide Tool Co Inc
ALASKAN—National Engineering & Mfg Co
ALBA-LITE—Corning Glass Works
ALBANY—Cooks Sons (Adam) Inc
Albertson & Co Inc 3100 Lowell Sioux City 2 Iowa
ALCOA—Aluminum Co of America
ALCOA—Rome Cable
ALDUTI—S & C Electric Co
ALECTRAL—General Cable Corp
ALEXALL—Boston Woven Hose & Rubber Co
Alexander-Tagg Industries Inc Jacksonville Road at Summit Ave Hatboro Pa
Alexander-Towle Industries—see Alexander-Tagg Industries Inc
ALGCO—Auburn Mfg Co
Alhambra Foundry Co Ltd 1147 Meridian Ave Alhambra Calif
ALISCO—Allen Iron & Steel Co
ALISPEDE—Allis (Louis) Co
Alk Co—see Alkco Mfg Co
Alkco Mfg Co 4242 N Lincoln Ave Chicago 18 Ill
ALKENEX—General Electric Co
ALL-BRITE—Fluorescent Fixtures of California
All-Brite Light Co 400 S 12 St Reading Pa
ALL-MOTOR—Falk Corp
ALL-RADIANT—Ampere Industries
ALL SQUARE—Guth (Edwin F) Co
All-State Welding Alloys Co Inc 249-55 Ferris Ave White Plains N Y
All-Steel Equipment Inc Aurora Ill
ALL-VISION—Mine Safety Appliances Co
ALL-WEATHER—Duro-Test Corp
ALL WEATHER—Michigan Fluorescent Light Div
ALL-WEATHER—Mine Safety Appliances Co
Allegheny Plastics Inc Rt 51 & Thorn Run Rd Coraopolis Pa
ALLEN—Excel Electric Service Co Inc
ALLEN—Lint (Clyde W)
Allen (L B) Co Inc 173-AF 5624 N Newark at Bryn Mawr Chicago 31 Ill
Allen-Bradley Co 136 W Greenfield Ave Milwaukee 4 Wis
Allen Cooler & Ventilator Inc 704 Woodward St Rochester Mich
Allen Electric and Equipment Co 2101-2117 N Pitcher St Kalamazoo Mich
Allen Iron & Steel Co P O Box 550 Norristown Pa
Allen-Stevens Conduit Fittings Corp 33-53 62nd St Woodside 77 N Y
Allen Ventilation Div—see Allen Cooler & Ventilator
Alliance Mfg Co Inc Lake Park Blvd Alliance Ohio
Allied Industries Inc P O Box 119 Ogallala Neb
Allied Lightning Protection—see Security Mfg & Contracting Co
Allied Mfg & Sales Co 3101 W Grand Ave Chicago 22 Ill
Allied Precision Industries 425 Stevens St (P O Box 149) Geneva Ill
ALLIGATOR—Porcelain Products Inc
ALLIGATOR JAW—Anderson (Albert & JM) Mfg Co
Allis (Louis) Co 427 E Stewart St Milwaukee 1 Wis
Allis-Chalmers Mfg Co 6930 S 70th St Milwaukee 1 Wis
ALLISPEDE—Allis (Louis) Co
ALMAG—Alpha Wire Corp
Almo Mfg Co 618 Jersey Ave Union Beach N J
ALNICO—Crucible Steel Co of America
ALPHA—Trombetta Solenoid Corp
Alpha Metals Inc 60C Water St Jersey City 4 N J
Alpha Wire Corp 200 Varick St New York 14 N Y
Alphaduct Wire & Cable Co 25 Van Dyke Ave (P O Box 709) New Brunswick N J
ALPHLEX—Alpha Wire Corp
ALTEMP—Alpha Wire Corp
ALTERNAC—Electric Arc Inc
ALTIMATIC—Air-Marine Motors Inc
ALU-FLEX—Auburn Mfg Co
ALUMALET—Killark Electric Mfg Co
ALUMALLOY—Killark Electric Mfg Co
ALUMATIC—Rich (Phil) Fan Mfg Co Inc
ALUMAWELD—Johnson Mfg Co Inc
ALUMI-DONE—Globe Lighting Products Inc
ALUMILIFT—Round (David) & Son Inc
ALUMINAIRES—McPhilben Mfg Co Inc
Aluminum Co of America 1501 Alcoa Bldg Pittsburgh 19 Pa
ALUMINUM-GRIP—Preformed Line Products Co
Alwalt Mfg Co 1706 Lapham Dr Modesto Calif
AMADCO—Associated Manufacturers & Distributors Corp
AMAIRCELL—American Electric Cable Co
AMARINE—American Steel & Wire Div
AMAZALOY—All-State Welding Alloys Co Inc
AMCODRUMS—Art Metal Co
AMCOLENS—Art Metal Co
AMER X—American Insulated Wire Corp
AMERAP—American Electric Cable Co
AMERBESTOS—American Steel & Wire Div United States Steel Corp
AMERCLAD—American Steel & Wire Div
AMERCORD—American Steel & Wire Div
AMEREX—Leviton Mfg Co Inc
AMERICAN BEAUTY—American Electrical Heater Co
American Blower Corp—see American-Standard
American Coach & Body Co—see McCabe-Powers Body Co
American Coils Co Route 524—Lakewood Rd Farmingdale N J
American Concrete Corp 5092 N Kimberly Ave Chicago 30 Ill
American Coolair Corp 3604 Mayflower St (P O Box 2300) Jacksonville 3 Fla
American Creosote Works Inc 1305 Dublin St (Box 4008) New Orleans 18 La
American Crossarm and Conduit Co 7726 Sheridan Rd Chicago 26 Ill
American District Telegraph Co 155 Sixth Ave NY 13 NY
American Electric Cable Co 181 Appleton St Holyoke Mass
American Electric Motors Inc—see American Electronics Inc
American Electric Switch Corp—see American Electric Switch Div
American Electric Switch Div Clark Controller Co 1146 E 152 St Cleveland 10 Ohio
American Electrical Heater Co 6110 Cass Ave Detroit 2 Mich
American Electronic Mfg Inc—see American Electronics Inc
American Electronics Inc 655 W Washington Blvd Los Angeles 15 Calif
American Engineering Co Wheatsheaf Lane & Sepviva St Philadelphia 37 Pa
American Floor Machine Co 518 S St Clair St Toledo 3 Ohio
American Gas Accumulator Co—see AGA Div
American Hard Rubber Co Ace Rd Butler N J

American Insulated Wire Corp 36 Freeman St Pawtucket R I
American Louver Co 5308 N Elston Ave Chicago 30 Ill
American Lumber & Treating Co—see Koppers Co Inc
American Metal Hose Div—see Anaconda Metal Hose Div
American Metal Moulding Co 146 Coit St Irvington N J
American Pipe Bending Machine Co Inc Poultney Vt
American Pipe Tool Co 4856 W Kinzie St Chicago 44 Ill
American Products Mfg Co Inc 8127-33 Oleander St New Orleans 18 La
American Pulley Co 4200 Wissahickon Ave Phila 29 Pa
American Rectifier Corp 95 Lafayette St N Y 13 N Y
American Sealants Co Hartford 6 Conn
American Sentry Inc 84 Bethlehem Pike Philadelphia 18 Pa
American Silver Co Inc Industrial Div 36-07 Prince St Flushing 54 N Y
American Solder & Flux Co 19th & Willard Sts Phila 40 Pa
American-Standard Industrial Div Detroit 32 Mich
American Steel & Iron Works 5801 S Lowe Ave Chicago 21 Ill
American Steel & Wire Div United States Steel Corp Rockefeller Bldg Cleveland 13 Ohio
American Super-Temperature Wires Inc Winooski Vt
American Tool & Engineering 2105 Moore St San Diego Calif
American Transom Co—see Security Insert Co
American Vacuum Co 8100 North Ridgeway Skokie Ill
AMERLOKT—American Steel & Wire Div United States Steel Corp
AMERPLASTIC—American Electric Cable Co
AMERPRENE—American Insulated Wire Corp
AMERTHERM—American Insulated Wire Corp
AMERTROL—American Insulated Wire Corp
AMERY—American Insulated Wire Corp
AMETALLIC—American Steel & Wire Div
Ammerman (CL) Co—see Ammerman Co Inc
Ammerman Co Inc P O Box 182 Stillwater Minn
AMP-FRA-LITE—Ampere Industries
AMP-QUARTZ—Ampere Industries
AMP-TRAP—Chase-Shawmut Co
Ampere Industries 60 Boston St Newark 3 NJ
Amperite Co Inc 561 Broadway NY 12 NY
Amplex Corp Glen Cove Rd Carle Place Long Island NY
Amplex Div Chrysler Corp P O Box 2718 Detroit 31 Mich
Amplex Mfg Co—see Amplex Div
AMPLI-SPEED—Electric Machinery Mfg Co
AMPLICALL—Rauland-Borg Corp
AMPROBE—Pyramid Instrument Corp
AMVAD—Edwards Co Inc
Anaconda Metal Hose Div American Brass Co P O Box 791 Waterbury 20 Conn
Anaconda Wire & Cable Co 25 Broadway New York 4 NY
ANACONDALOY—Anaconda Wire & Cable Co
ANALAC—Anaconda Wire & Cable Co
Anchor Mfg Co P O Box 959 Manchester NH
Anchor Metal Co Inc 966 Meeker Ave Brooklyn 22 NY
Anchor Packing Co 401 N Broad St Philadelphia 8 Pa
Anderson Brass Works—see Anderson Electric Corp
Anderson (A F) Iron Works—see American Steel & Iron Works
Anderson (Albert & JM) Mfg Co 289 A St Boston 10 Mass
Anderson Electric Corp P O Drawer 2151 Birmingham 1 Ala
ANHYDREX—Simplex Wire & Cable Co
ANHYDROPRENE—Simplex Wire & Cable Co
ANKOPRENE—Anchor Packing Co
ANKORITE—Anchor Packing Co
ANKOSEAL—Ansonia Wire & Cable Co
Annis (R B) Co 1101 N Delaware St Indianapolis 2 Ind
ANNOUNCEMAT—Recora Co Inc
ANNULITE—Rambusch Decorating Co
ANNUNCIETTE—Edwards Co Inc
ANOZINC—Metal & Thermit Corp
Ansonia Electrical Co—see Ansonia Wire & Cable Co
Ansonia Wire & Cable Co 111 Martin St Ashton RI
ANTENAPLEX—Radio Corp of America
ANTENSIFIER—Blonder-Tongue Laboratories Inc
Anthony (F M) Co 773 University Ave Berkeley 10 Calif
ANTI-ARC—Palmer Electric & Mfg Co
ANTI-KORODE—Arsco Mfg & Sales Corp
Apex Bolt Products Co 452-458 No Claremont Ave Chicago 12 Ill
Apex Wire & Cable Corp 237 37th St Brooklyn 32 NY
Apollo Lighting Fixture Co Inc 162 W Third St Mt Vernon NY
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 Ill
Appleton Rubber Co Inc 57 Cornwall St Boston 30 Mass
AQUA-TEMP—Acra Electric Corp
AQUALUX—Luxor Lighting Products Inc
AQUASORB—Turco Products Inc
AQUATHENE—General Cable Corp
ARC-ESCENT—Luxor Lighting Products Inc
Arco Mfg Co 1701 13th Ave North (Box 817) Grand Forks ND
ARCO WAND—American Vacuum Co
ARCTROL—Mullenbach Div
AREALENS—Art Metal Co
AREALUX—Lighting Products Inc
Arex Co 612 N Michigan Ave Chicago 11 Ill
AREX-AUSTOR—Arex Co
Argo Sales Co—see Argo Products Co
Argo Products Co 3500 Goodfellow St Louis 20 Mo
Aries Laboratories Inc 45-33 Davis St Long Island City 1 NY
ARIN—Arex Co
ARISTOLITE—Guth (Edwin F) Co
ARITEMP—Aries Laboratories Inc
Arjac Products Inc 55-59 Halstead St Rochester 10 NY
Ark-les Switch Corp 51 Water St Watertown Mass
ARK-TROL—Crouse-Hinds Co
ARKLESS—Economy Fuse Div
ARKTITE—Crouse-Hinds Co
Arlavox Mfg Co—Radionic Transformer Co
ARMAKOTE—Hatfield Wire & Cable Div Continental Copper & Steel Indus Inc
Armature Coil Equipment Inc 2605 Vega Ave Cleveland 13 Ohio
ARMATURO—Johns-Manville
ARMITE—Spaulding Fibre Co Inc
ARMO-LOK—Phelps Dodge Copper Products Corp
Armstrong-Bray & Co 5366 Northwest Highway Chicago 30 Ill
Armstrong Bros Tool Co 5200 W Armstrong Ave Chicago 46 Ill
ARRO-CORE—Arro Expansion Bolt Co
Arro Expansion Bolt Co P O Box 388 Marion Ohio
ARROFLUTE—Arro Expansion Bolt Co
Arrolet Corp Foot of Bower St Montgomery Pa
ARROVAL—Arrolet Corp
ARROW—Arrow-Hart & Hegeman Electric Co
Arrow Conduit & Fittings Corp 129 30th St Brooklyn 32 NY
Arrow Electric—see Arrow-Hart & Hegeman Electric Co
Arrow Fastener Co Inc 1 Junius St Brooklyn 12 NY
Arrow-Hart & Hegeman Electric Co 103 Hawthorn St Hartford 6 Conn
Arrow Lamps Inc 1270 Broadway New York 1 NY
Arsco Mfg & Sales Corp 438 Tenth Ave New York 1 NY
Art Metal Co 1814 E 40 St Cleveland 3 Ohio
Art Specialty Co 3720 N Milwaukee Ave Chicago 41 Ill
Artcraft Fluorescent Corp—see Artcraft Lighting Co Inc
Artcraft Lighting Co Inc 248 McKibben St Brooklyn 6 NY
ARTIC—Yardney Electric Corp
Artistic Lamp Mfg Co Inc 401 Fourth Ave NY 16 NY
Artolier Corp 139 Main St Lodi NJ
Artos Engineering Co 2757 S 28 St Milwaukee 46 Wis
ASARCOLO—Federated Metals Div
ASBESTICA—Johns-Manville
ASBESTITE—Burndy Corp
ASBESTOMENT—Johns-Manville
ASBESTON—United States Rubber Co
ASBESTOS EBONY—Johns-Manville
ASCOT—Pollak Luminescent Corp
Assembly Products Inc Chesterland 31 Ohio
Associated American Trading Div—see Associated American Winding Machines Inc
Associated American Winding Machines Inc 750 St Ann's Ave New York 56 NY
Associated Engineering Corp 65 Kent St Brookline 46 Mass
Associated Manufacturers & Distributors Corp 5015 S E Haig St Portland 6 Ore
Associated Research Inc 3789 W Belmont Ave Chicago 18 Ill
ASTRA-LITE—Metalcraft Products Co Inc
Athol Machine & Foundry Co 82 South St Athol Mass
Atkomatic Valve Co Inc 545 W Abbott St Indianapolis Ind
Atlantic Engravers Inc 52 Ocean Ave Amityville NY
Altantic Transformer Co 8330 Hegerman St Philadelphia 36 Pa
Atlantic Transformer Corp—see Atlantic Transformer Div
Atlantic Transformer Div New London Instrument Co Inc 30 Hynes Ave Groton Conn
ATLAS—SKF Industries Inc
ATLAS-AIRE—Atlas Tool & Mfg Co
Atlas Asbestos Co 423 Walnut St North Wales Pa
Atlas Electric Products Co 319 Ten Eyck St Brooklyn 6 NY
Atlas Mineral Products Co Mertztown Pa
Atlas Overhead Door Co Mill St at Reading Railroad Quakertown Pa
Atlas Tack Corp Pleasant & South Sts Fairhaven Mass
Atlas Tool and Mfg Co 5147 Natural Bridge Ave St Louis 15 Mo
Atlee Corp 47 Prospect St Woburn Mass
Atlight Lighting Equipment—see Atlas Electric Products Co
ATLITE—Atlas Electric Products Co
AUBESTON—Auburn Mfg Co
Auburn Mfg Co Pease Ave Stack St Middletown Conn
AUDIOPHONE—Femco Inc
AUDIOSPHERE—Simpson (Mark) Mfg Co Inc
AUDIOTONE—Peschel Electronics Inc
AURORA—Metalcraft Products Co Inc
Aurora Pump Co—Aurora Pump Div New York Air Brake Co
Aurora Pump Div New York Air Brake Co 54 Loucks St Aurora Ill
Austin (M B) Co—see Stonco Electric Products Co
AUT-O-DOR—Richards-Wilcox Mfg Co
AUTEX—Willard Storage Battery Div Electric Storage Battery Co
Auth Electric Co Inc 34-20 45th St LIC 1 NY
Auth Electrical Specialty Co Inc—see Auth Electric Co Inc
AUTHOTONE—Auth Electric Co Inc
Auto Arc-Weld Mfg Co 9615 Meech Ave Cleveland 5 Ohio
AUTO-BIN-DICATOR—Bin-Dicator Co
AUTO-BLOC—Round (David) & Son Inc
AUTO-PHONE—Couch (S H) Co Inc
Autocall Co 58 Warden Ave Shelby Ohio
AUTOCON—Automatic Control Co
AUTODYNE—Westinghouse Electric Corp
AUTOFLEX—Universal Metal Hose Co
AutoFYRstop Co 2035 Washington Ave Phila 46 Pa
AUTOGAP—Hubbard & Co
Automatic Control Co 995 University Ave St Paul 4 Minn
Automatic Devices 714 Hillgrove Ave Western Springs Ill
Automatic Electric Co Northlake Ill
Automatic Electric Mfg Co—see Aemco Inc
Automatic & Precision Mfg Co 252 Hawthorne Ave Yonkers 5 N Y
Automatic Products Co—see Controls Co of America
Automatic Switch Co 50-56 Hanover Rd Florham Pk N J
Automatic Transportation Co 101 W 87th St Chicago 20 Ill
Automatic Vulcanizers Corp 16 Hudson St New York 13 N Y
Automation Products Inc 3030 Max Roy St Houston 24 Tex
AUTOMATOR—Marathon Electric Mfg Corp
AUTORESET—AutoFYRstop Co
AUTOSET—Stromberg Time Corp
AUTOSPEED—Stromberg Time Corp
AUTOSTATIC—Lake Shore Electric Corp
Autotron Inc 3629 N Vermilion St Danville Ill
AVENARIUS CARBOLINEUM—Carbolineum Wood Preserving Co
AVIGATOR—Mitchell Industries Inc
Avion Div ACF Industries Inc 11 Park Pl Paramus N J
AXIFLO—Westinghouse Electric Corp
AXIVANE—Joy Mfg Co

B

B-LINE—Black (M) Mfg Co
BAC—Ettco Wire & Cable Corp
BBB—Becker Bros Carbon Co
BD—Beede Electrical Instrument Co Inc
BFC—Bernard-Franklin Co Inc
B M—Briegel Method Tool Co
B & M Electric Corp 168 7th St Brooklyn 15 N Y
B M & D—B M D & R Inc
B M D & R Inc 7020 Walker St St Louis Park Minneapolis 16 Minn
B-T LABS—Blonder-Tongue Laboratories Inc
BTC—Berkshire Transfer Corp
BTC—Brewer-Titchener Corp
BTC—Bush Transformer Corp
BVI—Burgess Vibrocrafters
B/W Controller Corp 2200 E Maple Rd Birmingham Mich
BABY-COM—Fanon Electronic Industries Inc
BABY VENT—Buffalo Forge Co
BADGER—Reliance Automatic Lighting Co
Badger Die Casting Corp 201 W Oklahoma Ave Milwaukee 7 Wis
Bahnson Co 1001 S Marshall St Winston-Salem N C
Bailey Meter Co 1050 Ivanhoe Rd Cleveland 10 Ohio
Baker-Barkon Co 1335 S W Morrison St Portland Ore
Baker Perkins Inc Saginaw Mich
Baker-Roos Inc 602 W McCarty St Indianapolis 6 Ind
BAKER SCAFFOLD—Baker-Ross Inc
BALANCE—Self-Lifting Piano Truck Co
BALCO—Driver (Wilbur B) Co
Baldor Electric Co 4353 Duncan Ave St Louis 10 Mo
BALL-RITE—Cummins Portable Tool Div John Oster Mfg Co
BALLOLITE—Line Material Industries
Ballymore Co Lincoln & Garfield Aves West Chester Pa
BAND-ROD—Sherman (HB) Mfg Co
BANNER-AIRE—Argo Products Co
BANTAM—American Rectifier Corp
BANTAM—Small Motors Inc
BANTAM-BIN-DICATOR—Bin-Dicator Co
Bar-Brook Mfg Co Inc 6133-35 Linwood Ave Shreveport La
Barber-Colman Co P O Drawer 99 Rockford Ill
Barber Electric Mfg Co Inc 30 Chestnut St N Attleboro Mass
Barber-Greene Co 400 N Highland Ave Aurora Ill
Barbour (J E) Co—see Ludlow Mfg & Sales Co
Barkelew Electric Mfg Co 1905 Columbia Ave Middletown Ohio
Barkon-Frink Tube Lighting Corp—see Frink Corp
Barksdale Valves 5125 Alcoa Ave Los Angeles 58 Calif
Barrett Varnish Co 1532 S 50th Ct Cicero 50 Ill
Barry Corp—see Barry Controls Inc
Barry Controls Inc 733 Pleasant St Watertown Mass
BARRYMOUNT—Barry Controls Inc
BARTAP—Burndy Corp
Barth Corp 12650 Brookpark Rd Cleveland 30 Ohio
Barth Stamping & Machine Works—see Barth Corp
Bartlett Mfg Co 3003 E Grand Blvd Detroit 2 Mich
BASEDUCT—National Electric Div H K Porter Co
Bashlin (W M) Co Bashlin Bldg Grove City Pa
BASIC UNIT—Electro Lighting Corp
BATCHOMATIC—Barber-Greene Co
BATTERY KEEPER—Rex Metal Craft Inc
BATTERY SCOPE—Christie Electric Corp
BAUER—Mission Appliance Corp
Bauer Electric—see Mission Appliance Corp
BEACON RAY—Federal Sign & Signal Corp
BEADS-IN-SLEEVES—Saxonburg Ceramics Inc
BEAM-O-MATIC—U-C Lite Mfg Co
BEAMSPOT—Amplex Corp
BEAUTY TONE—Westinghouse Electric Corp Lamp Div
Beaver-Advance Corp 12th & Factory Sts Ellwood City Pa
Beaver Art Metal Corp—see Beaver-Advance Corp

Beaver Pipe Tools Inc 310 Dana Ave N E Warren Ohio
Becker Bros Carbon Co 3450 So Laramie Ave Cicero 50 Ill
Becker Bros Electrical Corp—see Ther Electric & Machine Works
Beckley Electric Co Inc 468-470 Grand Ave Brooklyn 38 N Y
BECO—Westinghouse Electric Corp
Beede Electrical Instrument Co Inc Penacook N H
BELCAP—Sprague Electric Co
BELCO—Bogue Electric Mfg Co
BELCON—Bogue Electric Mfg Co
BELBOND—Belden Mfg Co
Belden Mfg Co P O Box 5070A Chicago 80 Ill
BELDENAMEL—Belden Mfg Co
BELDFOIL—Belden Mfg Co
BELDONLITE—Stamford Metal Specialty Co Inc
BELDSOL—Belden Mfg Co
BELDTHERM—Belden Mfg Co
Bell Electric Co 5735 S Claremont Ave Chicago 36 Ill
Bell Lumber & Pole Co 524 Midland Bank Bldg Minneapolis 1 Minn
Bell Pole Co Ltd—see Bell Lumber & Pole Co
Bell Sound Systems Inc 555 Marion Rd Columbus 7 Ohio
Bellevue Industrial Furnace Co 2620 Crane Ave Detroit 14 Mich
BELLOFRAM—General Control Co
BELT-AIR—Buffalo Forge Co
BELTA—Diamond Expansion Bolt Co Inc
Benbow Mfg Co—see Insul-8-Corp
BENFIELD—Steelduct Co
Benjamin Div Thomas Industries Inc 207 E Broadway Louisville 2 Ky
Benjamin Reel Products Inc 10700 Broadway Cleveland 25 Ohio
Benson (Alexander R) Co Inc 2 Davis Rd New Hartford N Y
BERALOY—Driver (Wilbur B) Co
Bergen Laboratories Inc 60 Spruce St Paterson 1 N J
Berko Electric Mfg Corp 212-40 Jamaica Ave Queens Village 28 N Y
Berkshire Laboratories 942 Bank Village Greenville N H
Berkshire Transformer Corp Kent Conn
BERMICO—Brown Co
Bernard-Franklin Co Inc Frankford & Torresdale Aves Philadelphia 24 Pa
Bernina Sewing Machine Co 29 W 35 St N Y 1 N Y
Berns Air King Corp 3050 N Rockwell St Chicago III
Bernz (Otto) Co Inc Driving Park & Ramona Rochester 13 N Y
BERNZ-O-MATIC—Bernz (Otto) Co Inc
BERNZRITE—Bernz (Otto) Co Inc
Berry (William B) Co 117 Causeway St Boston 14 Mass
Bertram (Harvey P) Co 2225 Bogen St Cincinnati Ohio
BESTO-WIRE—Rhode Island Insulated Wire Co Inc
BETA—Wakefield Co
Beverly Shear Mfg Co 3023 W 111 St Chicago 43 Ill
BI-FLO—Aerovent Fan Co Inc
BI-PRENE—Bishop Mfg Co
BI-SEAL—Bishop Mfg Corp
Biddle (James G) Co 1316 Arch St Phila 7 Pa
Biddle Trade Publishing Co 2720 Beverly Blvd Los Angeles 57 Calif
BIFURCATOR—DeBothezat Fans Div American Machine & Metals Co
BIG BEAM—U-C-Lite Mfg Co
BIG CHAMP—Champion DeArment Tool Co
BIGRED—Waco Mfg Co
BILGER—Self-Lifting Piano Truck Co
Billings & Spencer Co 1 Laurel St Hartford 1 Conn
Bin-Dicator Co 13946 Kercheval Ave Detroit 15 Mich
BIN-EYE—Jeffrey Mfg Co
BIN-FLO—Bin-Dicator Co
BIN-VUE—Controls Co of America
BIN-VUE—Convair Inc
Bios Laboratories Inc 17 W 60 St New York 23 NY
Birdsell Mfg Co Inc 750 San Antonio Rd Palo Alto Calif
Bishop Mfg Corp 10 Canfield Rd Cedar Grove NJ
BLACK BEAUTY—Texas Creosoting Co
Black (M) Mfg Co 300-08 N Third St Phila 6 Pa
Black & Decker Mfg Co Towson 4 Md
Black Line—Black (M) Mfg Co
Blackburn (Jasper) Corp 1525 Woodson Rd St Louis 14 Mo
Blackburn Specialty Co—see Blaco Mfg Co
Blackhawk Industrial Div Blackhawk Mfg Co 13320 W Reichert Pl Butler Wis
Blackhawk Industries 250 S Main St Dubuque Iowa
Blaco Mfg Co 6541 Euclid Ave Cleveland 3 Ohio
BLAKE—Couch (S H) Co Inc
Bliss Electronic Corp Sussex NJ
Blitz Electric Co 5713 Wentworth Ave Chicago 21 Ill
BLO-FAN—Emerson-Pryne Co
Blonder-Tongue Laboratories Inc 9 Alling St Newark 2 NJ
Blower (L R) Co—see Ripley Co Inc
BLU-RED—Associated American Winding Mach Inc
BLUE BONNET—Forston Co
BLUE BRUTE—Worthington Corp
BLUE DIAMOND—Pioneer Gen-E-Motor Co
BLUE DIAMOND—Whitman & Barnes Div United Drill & Tool Corp
Blue M Electric Co 138th & Chatham Sts Blue Island Ill
BLUE-POINT—Snap-on-Tools Corp
Bodendieck Tool Co P O Box 499 Taylorville Ill
Bodine Electric Co 2500 W Bradley Pl Chicago 18 Ill
BODINE FHP MOTORS—Bodine Electric Co
Bogen (David) Co Inc—see Bogen-Presto Co
Bogen-Presto Co Route 4 & Forest Ave (P O Box 500) Paramus NJ
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ
BON-E-CON—Bonney Forge & Tool Works
BONDEZE—Phelps Dodge Copper Products Corp
Bonnell (Wm A) Co—see Bonnell Electric Mfg Co Inc
Bonnell Electric Mfg Co Inc 192-194 Chambers St NY 7 NY
Bonnell Electrical Specialties—see Bonnell Electric Mfg Co Inc
Bonney Forge & Tool Works 2400 Rockhill Rd (North) Alliance Ohio
Borden Co—see Beaver Pipe Tools Inc
Borden Engineering Co—see Borden Engineering Div M J Johnson Aircraft Engineering Co
Borden Engineering Div M J Johnson Aircraft Engineering Co Box 10 Morristown NJ
BORNISIL—Westinghouse Electric Corp
BOROHM—Shallcross Mfg Co
Borthig (George C) Co Inc P O Box 115 East Rutherford NJ
BOSS—Huenefeld Co
Boston Gear Works 14 Hayward St Quincy 71 Mass
Boston Woven Hose & Rubber Co P O Box 1071 Boston 3 Mass
Bound Brook Oil-Less Bearing Co Bound Brook NJ
Bowers Battery & Spark Plug Co Box 1262 Reading Pa
Bowers Mfg Co Inc 6700 Avalon Blvd Los Angeles 3 Calif
BOX-LOK—Metalectrics Inc
Brach Mfg Corp 200 Central Ave Newark 3 NJ
Bradley Laboratories Inc—see Bradley Semiconductor Corp
Bradley Semiconductor Corp 275 Welton St New Haven 11 Conn
Brady (W H) Co 727 W Glendale Ave Milwaukee 9 Wis
Brady Milwaukee Co—Brady (W H) Co
Brand (William)-Rex Div American Enka Corp 31 Sudbury Rd Concord Mass
Brand Dielectrics 57 North St Willimantic Conn
Branham Mareck & Duepner Inc—see B M D & R Inc
BRASCOLITE—Guth (Edwin F) Co
BRAZALOY—All-State Welding Alloys Co Inc
BRAZECLAD—American Silver Co Inc
BREEZE-AIR—Buffalo Forge Co
BREEZE BUILDERS—Bar-Brook Mfg Co Inc
BREEZO—Buffalo Forge Co
Breuer Electric Mfg Co 5100 N Ravenswood Ave Chicago 40 Ill
Brewer-Titchener Corp 111 Port Watson St Cortland NY
Bridgeport Hardware Mfg Corp Scofield Ave Bridgeport 5 Conn
Briegel Method Tool Co 104 N E First St Galva Ill
Bright Star Battery Co—see Bright Star Industries
Bright Star Industries 600 Getty Ave Clifton NJ
Bristol Motor Div Vocaline Co of America Inc Coulter St Old Saybrook Conn
BRITE BEAM—Lightalarms Inc
BROADSTREETER—Metalcraft Products Co Inc
Broan Mfg Co Inc Hartford Wis
BRONCO—Western Insulated Wire Co
BRONCOBESTON—Western Insulated Wire Co
Bronze Bearings Inc 340 N Ave East Cranford NJ
Brook Motor Corp 3302-4 W Peterson Ave Chicago 45 Ill
BROOKS—Mine Safety Appliances Co
Brooks Lumber Co P O Box 153 Bellingham Wash
Brown Company 150 Causeway St Boston 14 Mass
BROWN DEVIL—Ohmite Mfg Co
Brown Instrument Co—see Minneapolis-Honeywell Regulator Co Industrial Div
Brown Instrument Div—see Minneapolis-Honeywell Regulator Co Industrial Div
Brown Products Corp 1090 Springfield Rd Union NJ
Brown Wood Preserving Co 409 Commonwealth Bldg Louisville 2 Ky
BROWN-X—Pass & Seymour Inc
BROWNING—Potter & Rayfield Inc
Brundee Co 48 Hale St Cranford NJ
Brunswick Instruments P O Box 813 New Brunswick NJ
BRUNT FAULTFINDER—Brundee Co
Bryant Electric Co 1421 State St (Box D Barnum Sta) Bridgeport 2 Conn
Bryant Mfg Co 410 N Paulina St Chicago 22 Ill
Buchanan Electrical Products Corp 434 US Route 22 Hillside NJ
BUCKEYE—Youngstown Sheet & Tube Co
Buckles (Chris) Inc 4830 S Hoyne Ave Chicago 9 Ill
BUDGET-LITES—Litecraft Mfg Co
BUDGETLITE—Ainsworth Lighting Inc
BUDGIT—Shaw-Box Crane & Hoist Div
Buffalo Forge Co 490 Broadway Buffalo 5 NY
Buffalo Machine Mfg Co 586 Tonawanda St Buffalo 7 NY
BUG-A-WAY—Westinghouse Electric Corp Lamp Div
BUG CHASER—Amplex Corp
Buggie (HH)—see Burndy Corp
BUILDERS—Stanley Electric Tools
Building Service Co 4923 18th Ave S Minneapolis 17 Minn
BUILT-IN-WATCHMEN—Westinghouse Electric Corp
BUILTOGETHER—Fairbanks Morse & Co
BULL DOG—Boston Woven Hose & Rubber Co
BULL DOG—Marvel Lamp Co
Bulldog Div Gregory Industries Inc Toledo Ave & East 28 St Lorain Ohio
Bulldog Electric of Denver—see Young Electric & Mfg Co Inc
BullDog Electric Products Co—see BullDog Electric Products Div
BullDog Electric Products Div I-T-E Circuit Breaker Co 7610 Joseph Campau Detroit Mich
BULLS-I-UNIT—Kirkland (H R) Co
Bunnell (G F) Co—see Atlantic Engravers Inc
Bunting Brass and Bronze Co 715 Spencer St Toledo 1 Ohio
Burbank Electrical Products 215 W Palm Ave P O Box 7 Burbank Calif
BURCAP—Burndy Corp
Burgess Battery Co Handi Craft Div—see Burgess Vibrocrafters
Burgess Battery Co Freeport Ill
Burgess Vibrocrafters Grayslake Ill
Burling Instrument Co Inc 16 River Rd Chatham NJ
Burndy Corp Norwalk Conn
Burndy Engineering Co—see Burndy Corp
Burnley Battery & Mfg Corp 103 Clay St (P O Box 511) North East Pa
Burns (James F) Co 1601 Industrial Highway Pennsauken NJ
Burr Aluminum Products Div—see Keyes-Davis Co
Burt Mfg Co 936 S High St Akron 11 Ohio
Burton Mfg Co 2520 Colorado Ave Santa Monica Calif
Busada Mfg Corp 32-21 Downing St Flushing 54 NY
Bush Transformer Corp 707 North St Endicott NY
Bush TX Corp—see Bush Transformer Corp
BUSS—Bussmann Mfg Div McGraw-Edison Co
Bussmann Mfg Div McGraw-Edison Co University at Jefferson St Louis 7 Mo
BUSTER—Lidseen of North Carolina Inc
BUSTRIBUTION—BullDog Electric Products Div I-T-E Circuit Breaker Co
BUTTIN—Burndy Corp
BUZABEL—Edwards Co Inc
BUZACALL—Edwards Co Inc
Byers Co Clark Bldg Pittsburgh 30 Pa
BYTAP—Burndy Corp

C

C & B Engineering and Fabricating Corp P O Box 8701 Houston Tex
CBC Electronics Co Inc 2601 N Howard St Philadelphia 33 Pa
CCA—Coil Co of America Inc
C & D Batteries Div Electric Autolite Co Washington & Cherry Sts Conshohocken Pa
CDM—Curtis Development & Mfg Co
C&E—Ericson Mfg Co
CFI—Day-Brite Lighting Inc
C-H—Cutler-Hammer Inc
C-I BOARD—Century Lighting Inc
C-LECTOR—Century Lighting Inc
C-L-X—Simplex Wire & Cable Co
C M—Chicago Miniature Lamp Works
CM—Chisholm-Moore Hoist Div Columbus McKinnon Chain Corp
C N M—Conduit Nipple Mfg Co
COM—Wing (L J) Mfg Co
C P—Chicago Pneumatic Tool Co
C-Q-T—Chase-Shawmut Co
C-RITE—Dependable-Electric Mfg Co Inc
C T R—Cincinnati Time Recorder Co
C & W Sales Co—see Clark (George P) Div Cregin & Wilkins Co Inc
CWC Corp—see Crozier Machine Tool Co
CABINETROL—General Electric Co
CABLE BASKET—Chalfant Products Co Inc
Cable Electric Products Inc 234 Daboll St Providence 7 RI
CABLEMATIC—Will-Son Mfg Co
CABLERACK—Chalfant Products Co Inc
CABLETRAY—Chalfant Products Co Inc
CABLETROF—P-W Industries Inc
CABLETROUGH—Chalfant Products Co Inc
CABLEX—Collyer Insulated Wire Co
CADDY—Erico Products Inc
CADET—Guth (Edwin F) Co
CADET—Linemaster Switch Corp
CADILLAC—Clements Mfg Co
CADILLAC—Waveland Electric Co
CADWELD—Erico Products Inc
CALCULITE—Lightolier Inc
Califone Corp 1041 N Sycamore Ave Hollywood 38 Calif
California Reinforced Plastics Co—see Hexcel Products Inc
CALK-INS—Rawlplug Co Inc
Calpa Products Co 5420 Paschall Ave Phila 43 Pa
CALSUN BRONZE—Anaconda Wire & Cable Co
CALTROL—Caltron Products Co
Caltron Co—see Caltron Products Co
Caltron Products Co 3518 W Pico Blvd Los Angeles 19 Calif
Calumet Plastics Inc 11201 S Cottage Grove Ave Chicago 28 Ill
Calvert Co 19851 Ingersoll Dr Rocky River 16 Ohio
Cam-Lok Div Empire Products Inc 9201 Blue Ash Rd (Box 98) Cincinnati 36 Ohio
CAM-VAR—Electro-Technical Products Div
Camblock Corp 825 Bronx River Ave New York 72 NY
CAMBRICOID—American Electric Cable Co
CAMEO—Rodale Mfg Co Inc
Can Arm Corp P O Box 156 Champlain NY
CANDELITE—Duro-Test Corp
CANDLEFLAME—North American Electric Lamp Co
CANDYLBEME—North American Electric Lamp Co
Canning-Pekara Inc 2144 N Wood St Chicago 14 Ill
Cannon Electric Co 3208 Humboldt St Los Angeles 31 Calif
Cannon Electric Development Co—see Cannon Electric Co
CANSEAL—Cannon Electric Co
CAPAC—Engelhard (Charles) Inc
CAPACOHMETER—Simpson Electric Co
CAPCO—Capitol Stage Lighting Co Inc
CAPCOLITE—Capitol Stage Lighting Co Inc
Capewell Mfg Co 60-70 Governor St Hartford 2 Conn
CAPILLARY—Air & Refrigeration Corp

Capitol Hardware Mfg Co Inc 400 N Leavitt St Chicago Ill
Capitol Stage Lighting Co Inc 527 W 45 St New York 36 N Y
CAPRI—Frigid Inc
CAPRI—Swivelier Co Inc
Capson Mfg Co 2565 W Fullerton Ave Chicago 47 Ill
CARBI-TWIST—U S Expansion Bolt Co
Carboline Co 32 Hanley Industrial Ct St Louis 17 Mo
Carbolineum Wood Preserving Co 6683 N 40 St Milwaukee 9 Wis
CARBOLON—Carbone Corp
CARBOLUBE—Carbone Corp
CARBOMITE—Continental Carbon Div of Wirt Co
Carbon Engineering Corp P O Box 256 Slinger Wis
Carbone Corp 400 Myrtle Ave Boonton N J
CARENCO—Carbon Engineering Corp
CARGOLITE—Steber Mfg Co
Carlon Products Corp P O Box 133 Aurora Ohio
Carney (B J) & Co 326 Peyton Bldg Spokane 8 Wash
Carol Cable Co 190 Middle St Pawtucket R I
CAROPRENE—Carol Cable Co
Carpenter Mfg Co 2250 Bradley St Somerville 45 Mass
Carrier Corp Carrier Parkway Syracuse 1 N Y
Carter (R L) Co—see Stanley Electric Tools
Carter Motor Co 2711 W George St Chicago 18 Ill
CARTON—Self-Lifting Piano Truck Co
CARTRIJ-DRY—Pyramid Electric Co
Case (J I) Co Racine Wis
CASEAMATIC—Alliance Mfg Co Inc
Castle Engineering Co P O Box 35 Seneca Castle N Y
Castle Hills Corp—see Hartzell Propeller Fan Co
CASTOHM—Shallcross Mfg Co
CASTOMATIC—Federated Metals Div American Smelting & Refining Co
CATALINA—Benjamin Division (Thomas Industries Inc)
CATALINA—Industrial Lamp Corp
CATALINA—Swivelier Co Inc
CATARACT—Ajax Electric Co
Caterpillar Tractor Co Industrial Engine Plant Peoria Ill
Cathodic Protection Service 4601 Stanford St Houston Tex
Cathonics Inc—see Cold Cathode Lighting Corp
CAVALIER—Wakefield Co
Cavalier Air Conditioning Co—see Forston Co
Cavalier Corp Electric Heating Div 343 W First St Chattanooga Tenn
Ceco Steel Products Corp 5601 W 26 St Chicago 50 Ill
CEETEE—Crescent Tool Co
CEFCO—Commercial Enclosed Fuse Co of N J
Ceilheat Inc 5212 Homberg Drive Knoxille Tenn
Ceiling Materials Co 1035 Firestone Blvd Memphis Tenn
CEILCELL—United Lighting & Ceiling Co
CEILGLO—United Lighting & Ceiling Co
CEILGRID—United Lighting & Ceiling Co
CEILITE—United Lighting & Ceiling Co
CEILO—Gibson Mfg Co
CEILUME—United Lighting & Ceiling Co
CELENAMEL—Belden Mfg Co
CEMCO—Connecticut Electric Mfg Co
CENCO—Central Scientific Co
CENTAWATT—Wesix Electric Heater Co
CENTR-A-POWER—General Electric Co
Central Neon Co—Centralite Co Inc
Central Porcelain Co 507 Railroad St Columbiana Ohio
Central Scientific Co 1700 Irving Pk Rd Chicago 13 Ill
Central Station Signals Inc 53 W 23 St New York 10 N Y
Central Transformer Co 900 W Jackson Blvd Chicago 7 Ill
Central Transformer Corp P O Box 687 Pine Bluff Ark
Centralite Co Inc Dayton & Central Aves Cincinnati 14 Ohio
CENTRI-CORE—Alpha Metals Inc
CENTRL-VENT—Lau Blower Co
CENTROL—Nelson Electric Mfg Co
CENTRON—Sunbeam Lighting Co
Century Electric Co 1806 Pine St St Louis 3 Mo
Century Fan & Ventilator Co 45 Cedar St Stamford Conn
Century Lighting Inc 521 W 43 St New York 36 N Y
CERAMAGNET—Stackpole Carbon Co
Ceramic Specialties Co—see Lint (Clyde W)
CERTAIN CURTAIN—Hayes (C I) Inc
Certified Ballasts Mfrs—see Fleur-O-Lier Mfrs
Certified Fleur-O-Lier Mfrs—see Fleur-O-Lier Mfrs
CESCO—Code Equipment Sales Co
Chadsey Corp P O Box 1858 Hartford 1 Conn
Chadsey Mfg Co Inc—see Chadsey Corp
Chain Belt Co 4701 W Greenfield Ave Milwaukee 1 Wis
CHAIN MATE—Radix Wire Co
CHAIN-O-LITE—House-O-Lite Corp
Chalfant Products Co Inc 11525 Madison Ave Cleveland 2 Ohio
CHALKBOARD—Solar Light Mfg Co
CHALLENGER—Bogen-Presto Co
CHALLENGER—Coffing Hoist Div Duff-Norton Co
CHAMCO—Chalfant Products Co Inc
Chamor Mfg Corp 43-63 11th St Long Island City 1 N Y
CHAMPION—Turner Brass Works
CHAMPION—Winpower Mfg Co
CHAMPION—York Div Borg-Warner Corp
Champion DeArment Tool Co South Main St Meadville Pa
Champion Lamp Works 330 Lynnway Lynn Mass
Champion Mfg Co—see Winpower Mfg Co
Chance (A B) Co 210 N Allen St Centralia Mo
Chandeysson Electric Co 4084 Bingham Ave St Louis 16 Mo
CHANGE-A-CYCLE—Carter Motor Co
CHANGE-A-VOLT—Carter Motor Co
CHANGE-OUT—Joy Mfg Co
CHANNEL-DUCT—Glastic Corp
CHANNELITE—Swivelier Co Inc
CHANNELLOCK—Champion DeArment Tool Co
Chapin (Chas E) Co Inc 227 Fulton St NY 7 NY
Chapman (PE) Electrical Works Inc 1820 Chouteau Ave St Louis 3 Mo
CHARCO—Charleston Rubber Co
CHARG-O-MATIC—Hertner Electric Co
CHARGAMATIC—Electric Cord Co
CHARGE-A-PACK—Electric Service Systems Inc
CHARGE CONTROL—Exide Industrial Div
CHARGICATOR—Hickok Electrical Instrument Co
Charles Machine Works Inc P O Box 66 Perry Okla
Charleston Rubber Co Stark Industrial Park Charleston S C
CHASBESTOS—Chase & Sons Inc
CHASE—Thomas & Betts Co
Chase Brass & Copper Co Inc 236 Grand St Waterbury 20 Conn
CHASE-COTE—Chase & Sons Inc
CHASEFIL—Chase & Sons Inc
CHASE PRIME—Chase & Sons Inc
Chase-Shawmut Co 374 Merrimac St Newburyport Mass
Chase & Sons Inc 26 Spruce St North Quincy Mass
CHASE WRAP—Chase & Sons Inc
CHEERLIGHT—Aerolux Lights Corp
Chelsea Fan and Blower Co 639 South Ave Plainfield N J
CHEM-MARINE—Hubbell (Harvey) Inc
Chemalloy Electronics Corp Gillespie Field Santee Calif
Cherry Electrical Products Corp 1650 Deerfield Rd Highland Park Ill
Chesflex Corp 684 Nepperhan Ave Yonkers N Y
Chester Cable Corp Oakland Ave Chester N Y
Chester Hoist Div National Screw & Mfg Co Lisbon Ohio
Chester Mfg Co—see Chester Hoist Div National Screw & Mfg Co
CHICAGO—Klein (Mathias) & Sons
CHICAGO—Lidseen of North Carolina Inc
Chicago Blower Corp 9867 Pacific Ave Franklin Park Ill
Chicago Commutator Inc Wheeling Rd & Exchange Ct Wheeling Ill
Chicago Decalcomania Co 3310 Elston Ave Chicago 18 Ill
Chicago Die Casting Mfg Co 2510-14 W Monroe St Chicago 12 Ill
Chicago Metal Hose Corp—see Flexonics Corp
Chicago Miniature Lamp Works 1500 N Ogden Ave Chicago 10 Ill
Chicago Pneumatic Tool Co 6 E 44 St NY 17 NY
Chicago Roller Skate Co—see Ware Fuse Corp
CHICAGO-SIGNAL—Couch (SH) Co Inc
Chicago Tubing & Braiding Co—see Flexonics Corp
Chicago Wire Iron & Brass Works 2411 W Belmont Ave Chicago 18 Ill
CHIEF—Collins Machinery Corp
CHILCO—Chicago Miniature Lamp Works
CHILL AIR—National Engineering & Mfg Co
CHINALAK—Dolph (John C) Co
Chisholm-Moore Hoist Corp—see Chisholm-Moore Div Columbus McKinnon Chain Corp
Chisholm-Moore Hoist Div Columbus McKinnon Chain Corp 6072 Fremont Ave Tonawanda N Y
CHLOREXTOL—Allis-Chalmers Mfg Co
CHLOROLUX—Luxor Lighting Products Inc
CHORDETTE—Edwards Co Inc
Christie Electric Corp 3410 West 67 St Los Angeles 43 Calif
CHROMALOX—Wiegand (Edwin L) Co
CHROME-X—Pass & Seymour Inc
CHRONISTER—Bergen Laboratories
CHRONO-SPRAY—Paragon Electric Co
CHRONO-TEMP—Paragon Electric Co
Chronoflash Co Oakdale Pa
CHRYSLER AIRTEMP—Airtemp Div Chrysler Corp
CINCH—National Lead Co
Cincinnati Clock & Instrument Co 1117 Harrison Ave Cincinnati 14 Ohio
Cincinnati Time Recorder Co 1733 Central Ave Cincinnati 14 Ohio
Circ-Lite Inc—see Hasco Electric Corp
CIRCA-LITE—Sterner Industries
CIRCAB—Circle Wire & Cable Corp
CIRCLARC—Westinghouse Electric Corp Lamp Div
Circle Air Industries Inc 244 Herkimer St Brooklyn 16 N Y
Circle Air Products Inc—see Circle Air Industries Inc
CIRCLE B—Bristol Motor Div Vocaline Co of America Inc
CIRCLE D—Natale Machine & Tool Co
Circle F Mfg Co 720 Monmouth St Trenton 4 N J
CIRCLE L—Lew Electric Fittings Co
Circle Wire and Cable Corp 5500 Maspeth Ave Maspeth L I N Y
Circlelite Corp—see House-O-Lite Corp
CIRCLELUX—Pfaff & Kendall
CIRCLEMOLD—Circle Wire & Cable Corp
CIRCLESHEATH—Circle Wire & Cable Corp
CIRCLETROL—Electrical Mfg Co
CIRCLGRID—Wilson (JA) Lighting & Display Inc
CIRCLINE—Sun-Lite Mfg Co
CIRCLOC—Circle Wire & Cable Corp
CIRCLOK—Circle F Mfg Co
CIRCUITROL—Continental Electric Equipment Co
CIRCULAIR—Kisco Co Inc
Circulators Devices Mfg Corp—see Frigid Inc
CIRCULITE—Lightolier Inc
CIRFLEX—Circle Wire & Cable Corp
CIRKLAIR—Folsom Co Inc
CIRTEX—Circle Wire & Cable Corp
CIRTUBE—Circle Wire & Cable Corp
CIRTUF—Circle Wire & Cable Corp
Clarage Fan Co Kalamazoo Mich
Clare (C P) & Co 3101 Pratt Blvd Chicago 45 Ill
CLAREMONT—Lightolier Inc
Clark (George P) Div Cragin & Wilkins Co Inc Fitchburg Mass
Clark Controller Co 1146 E 152 St Cleveland 10 Ohio
Clark-Cooper Co Inc 317 N Market St Palmyra N J
CLASSIC—Carter Motor Co
CLAUDE BANKS—Kirlin Co
CLEAN-FLO—Allis (Louis) Co
CLEAN-O-MATIC—Siebring Mfg Co
Clean Sweep Co 6534½ Whittier Blvd Los Angeles 22 Calif
CLEAR-SELE—Rust-Oleum Corp
CLEARSITE—Economy Fuse Div
Clement Electric Co 223 Erie St N W Grand Rapids 2 Mich
Clement Industrial Electric Co—see Clement Electric Co
Clements Mfg Co 6650 S Narragansett Ave Chicago 38 Ill
Cleveland Electric Motor Co 5213 Chester Ave Cleveland 3 Ohio
Cleveland Switchboard Co 2925 E 79 St Cleveland 4 Ohio
Cleveland Trencher Co 20100 St Clair Ave Cleveland 17 Ohio
CLI-MO-TROL—Weltronic Co
CLICK DIAL—Penn Controls Inc
CLICK-ON—Electrical Fittings Corp
CLIFTALL—Clifton Conduit Corp
Clifton Conduit Co Inc—see Clifton Conduit Corp
Clifton Conduit Corp 3300 Eastbourne Ave Baltimore 24 Md
Clifton Mfg Co Inc 34 Topalian St Mattapan Boston 26 Mass
CLIFTX—Clifton Conduit Corp
CLIMATE CHANGER—Trane Co
CLIMATROL—Mueller Climatrol
CLIMAX—Glade Mfg Co
CLINI-GRAPH—Weksler Instrument Corp
CLIPPER—General Controls Co
CLIPPER—Linemaster Switch Corp
CLIPPER—Walker Brothers
Clipper Mfg Co 2800 Warwick Kansas City 8 Mo
CLORINOL—Sprague Electric Co
CLOSED-BACK—U S Expansion Bolt Co
CLUSTER LITE—Revere Electric Mfg Co
Coates Electric Mfg Co 3419-11th Ave S W Seattle 4 Wash
COBANIC—Driver (Wilbur B) Co
COBENIUM—Driver (Wilbur B) Co
COCO—Coil Co of America Inc
CODE-CALL—Wheelock Signals Inc
Code Development Co—see Code Equipment Sales Co
Code Equipment Sales Co P O Box 5847 Philadelphia 28 Pa
Code Products Corp—see Code Equipment Sales Co
COFFEE-HOT—Supreme Electric Products Co
Coffing Hoist Co—see Coffing Hoist Div Duff-Norton Co
Coffing Hoist Div Duff-Norton Co Danville Ill
COHRFOAM—Connecticut Hard Rubber Co
COHRLASTIC—Connecticut Hard Rubber Co
Coil Co of America Inc 207-209 Washington St Northvale N J
COIL-FLEX—Ideal Industries Inc
Cold Cathode Corp—see Cold Cathode Lighting Corp
Cold Cathode Lighting Corp 76 S Bayles Ave Port Washington N Y
COLDCOTE—Anaconda Wire & Cable Co
Cole (C W) & Co Inc P O Box 3382 Los Angeles 54 Calif
Cole Electric Products Co—see Federal Pacific
Collins Machinery Corp 955 Monterey Pass Rd Monterey Park Calif
Collyer Insulated Wire Co 249 Roosevelt Ave Pawtucket R I
Colonial Electric Products Div Colonial Neon Co Inc 1-115 Market St East Paterson NJ
COLOR TONE—Westinghouse Electric Corp Lamp Div
COLORBEAM—Amplex Corp
COLORSCOPE—Simpson Electric Co
COLORTONE—Jay Lighting Mfg Co Inc
COLOVOLT—Pollak Luminescent Corp
Columbia Cable & Electric Corp 255 Chestnut St Brooklyn 8 N Y
Columbia Electric Mfg Co 4519 Hamilton Ave Cleveland 14 Ohio
Columbia Electric & Mfg Co North 2310 Fancher Way Spokane Wash
COLUMBIA-FLEX—Columbia Cable & Electric Corp
Columbia Industries Inc—see Columbia Products Inc
Columbia Metal Box Co 260 E 143 St NY 51 N Y
Columbia Products Inc Wrightsville Pa
COLUMBIA-QUALITY—Columbia Metal Box Co
COLUMBUS—Conduit Pipe Products Co
Columbus Products Corp—Greibach Instruments Corp
Com-Pak-Ett Mfg Corp 650 Grand St Allegan Mich
Comar Electric Co 3349 W Addison Chicago 18 Ill
COMBI—Wodack Electric Tool Corp
COMET—Standard Electric Co Inc
Comet Lamp Co 5 E 35 St New York 16 N Y
COMFO—Mine Safety Appliances Co
COMFORT CONTROL—Controls Co of America
COMFORT-SHIELD—Lincoln Electric Co
Commercial Enclosed Fuse Co of N J 6812 Polk St Guttenberg N J
Commercial Reflector & Mfg Co 3109 Maple Ave Los Angeles 11 Calif
COMMERCIALAIRE—Frigid Inc
Commercialaire Corp of America 840 E 98 St Brooklyn 36 N Y
COMMERCIALITE—Commercial Reflector & Mfg Co
COMMODORE—Wakefield Co
COMMUNICALL—Sperti Faraday Inc
COMMUNICATOR—Godfrey Mfg Co
COMPACK—General Cable Corp
COMPACT—Linemaster Switch Corp
Compco Corp 1800 N Spaulding Ave Chicago 47 Ill

COMPO—Bound Brook Oil-Less Bearing Co
COMPOUND LEVER—Bartlett Mfg Co
CON-FER-PHONE—Simpson (Mark) Mfg Co Inc
Conant Laboratories Box 3997 Bethany Station Lincoln 5 Neb
CONCENTROL—Continental Electric Equipment Co
Concrete Engineering Co—see Ceco Steel Products Corp
CONDEX—Simplex Wire & Cable Co
Condi-Lite Corp 889 Broadway New York 3 NY
CONDIT—Allis-Chalmers Mfg Co
CONDOR—Raybestos-Manhattan Inc
CONDU-MATIC—Chamor Mfg Corp
CONDUCTO-LUBE—Cool-Amp Co
Conduflor Corp 13560 Lorain Ave (P O Box 2748) Cleveland 11 Ohio
CONDUIT OF COLUMBUS—Conduit Pipe Products Co
Conduit Fittings Corp 6400 W 66th St Chicago 38 Ill
Conduit Nipple Mfg Co 1455 Spring Garden Ave Pittsburgh 12 Pa
Conduit Pipe Products Co 157 W Fulton St Columbus 16 Ohio
CONDULET—Crouse-Hinds Co
CONEX—Weiss & Biheller Merchandise Corp
CONIC—Hilti Rapid Fastening Systems Inc
Connecticut Electric Mfg Co Main St Bantam Conn
Connecticut Hard Rubber Co 407 East St New Haven 9 Conn
CONQUEROR—York Div Borg-Warner Corp
CONROD THE CONTROL—Dixie Controller Inc
CONSOLAIRE—Remington Corp
CONSTELLATION—Trindl Products Ltd
CONTINENTAL—Crane (H W) Co
CONTINENTAL—Globe Lighting Products Inc
Continental Carbon Div of Wirt Co 5221 Greene St Philadelphia 44 Pa
Continental-Diamond Fibre Newark Del
Continental Electric Co 1234 S Prairie Ave (P O Box 895) Hawthorne Calif
Continental Electric Co Inc 325 Ferry St Newark 5 N J
Continental Electric Equipment Co Box 1055 Cincinnati 1 Ohio
Continental Radiant Glass Heating Corp 4 W 40 St New York 18 N Y
Continental Wire Corp P O Box 366 Wallingford Conn
CONTRA-DYNE—Electric Controller & Mfg Co
CONTRA-TORQUE—Electric Controller & Mfg Co
Control Panel Corp 517 W Monroe St Chicago 6 Ill
Control Switch Div Controls Co of America 4218-30 W Lake St Chicago 24 Ill
CONTROLARC—Vickers Inc
CONTROLEAD—Marathon Special Products Corp
CONTROLENS—Holophane Co Inc
CONTROLITE—Line Material Industries
CONTROLITE—Ward Leonard Electric Co
CONTROLMAX—Sangamo Electric Co
Controls Co of America 2450 N 32 St Milwaukee 45 Wisc
Convair Inc P O Box 9671 Pittsburgh 16 Pa
CONVERS-O-CALL—Adcrafters Co
CONVERTI-FUSE—General Electric Co
Cook's Sons (Adam) Inc 5 N Stiles St Linden N J
Cool-Amp Co 8603 W 17 Ave Portland 19 Ore
COOL-CIRCLE-ATOR—Kisco Co Inc
Cool-ette Inc 7535 W 8 Mile Rd Detroit 21 Mich
COOL-SPOT—Signal Electric Div King-Seeley Corp
COOLAIR—American Coolair Corp
Coolerator Div McGraw-Edison Co 704 Clark St N Albion Mich
COOLERO—Hirschman-Pohle Co Inc
COOLINE—Ohio Brass Co
Cooper (D C) Co 1467 S Michigan Ave Chicago 5 Ill
Cooper Hewitt Electric Co 720-732 Grand St Hoboken N J
Co-operative Utilities Co Inc 4637-39 Mulberry St Phila 24 Pa
COPACO—Cottrell Paper Co Inc
COPALAM—Cottrell Paper Co Inc
Cope (T J) Div Rome Cable Corp Third & Walnut Sts Collegeville 5 Pa
COPING-LITE—Magni Flood Inc
COPPERSPUN—Fairbanks Morse & Co
COPPERTONE—Globe Lighting Products Inc
Copperweld Steel Co Wire and Cable Div Glassport Pa
Coppus Blue Ribbon Products—see Coppus Engineering Corp
Coppus Engineering Corp 344 Park Ave Worcester 10 Mass
Coral Cable Co P O Box 260 Pawtucket RI
CORAL DESIGNS—Dietz (Henry G) Co Inc
Corborundum Co (Refractories Div)—see Globar
CORDETTE CASUALS—Moe Light Div Thomas Industries Inc
Cordomatic Div Vacuum Cleaner Corp of America 1724 W Indiana Ave Phila 32 Pa
CORDON—I-T-E Circuit Breaker Co
CORE BORE—Equipment Corp of America
CORE-O-MATIC—Induction Heating Corp
CORE VENT—Super Tool Co
CORE-VENT—U S Expansion Bolt Co
Cornell-Dubilier Electric Corp 333 Hamilton Blvd South Plainfield N J
Corning Glass Works Corning N Y
Cornish Wire Co Inc 50 Church St N Y 7 N Y
Corona Equipment Co Inc—see Corona Mfg Corp
Corona Mfg Corp 11300 Tuxford St Sun Valley Calif
CORONET—Jay Lighting Mfg Co Inc
COROPRENE—Cornish Wire Co Inc
COROPREX—Cornish Wire Co Inc
COROX—Westinghouse Electric Corp
CORRALINE—Day-Brite Lighting Inc
CORRALUME—Day-Brite Lighting Inc
CORRECTOLITE—Holophane Co Inc
CORRIB—Ohmite Mfg Co
CORRIDOR-LITE—House-O-Lite Corp
CORRU-LUMINUS—Luminous Ceilings Inc
CORSAIR—Scranton Storage Battery Corp
CORVEL—Polymer Corp
COTENAMEL—Belden Mfg Co
Cottrell Paper Co Inc 10 Purchase St Fall River Mass
COUCH-CALL—Couch (S H) Co Inc
Couch (S H) Co Inc 3 Arlington St North Quincy 71 Mass
Couch Ordnance Div—see Couch (S H) Co Inc
Counter & Control Corp 4503 W Brown Deer Rd Milwaukee 23 Wis
COUNTER-FLOW—Blue M Electric Co
COVERLITE—Steber Mfg Co
COZY GLOW—Westinghouse Electric Corp
CRADLECLIP—Electrovert Inc
CRAFT LITE—Paramount Industries Inc
CRAFTSCOPE—Waterman Products Co Inc
CRAFTSMAN—Stahl Metal Products Inc
Cramer (R W) Co—see Cramer Controls Corp
Cramer Controls Corp Main St Centerbrook Conn
Crane (H W) Co 15 N 9th Ave Maywood Ill
Crane-Puller Co Waltham 54 Mass
CRANELITE—Holophane Co Inc
CraneVeyor Corp 1240 S Boyle Ave Los Angeles 23 Calif
CRESCENT—Abrams Lighting
CRESCENT—Barksdale Valves
CRESCENT—Wheeler Reflector Co
Crescent Co Inc 20 Central Ave Pawtucket R I
Crescent Insulated Wire Cable Co 319 N Olden Ave Trenton 5 N J
Crescent Plastics Inc 955 Diamond Ave Evansville 7 Ind
Crescent Tool Co 200 Harrison St Jamestown N Y
CRESCORD—Crescent Insulated Wire & Cable Co
CRESFLEX—Crescent Insulated Wire & Cable Co
CRESLINE—Crescent Plastics Inc
Crest Transformer Corp 1834-36 W North Ave Chicago 22 Ill
CRESTBRITE—Crest Transformer Corp
CRESTOLOY—Crescent Tool Co
CRESTRAN—Crest Transformer Corp
CRESTROL—Crest Transformer Corp
CRESYNTHOL—Crescent Insulated Wire & Cable Co
CRIMCUT—Vaco Products Co
CRIMPEE—Cannon Electric Co
CRIMPIT—Burndy Corp
Crise Controls Div—see Acro Div Robertshaw-Fulton Controls Co
Crittenden Transformer Works Inc 13011 S Spring St Los Angeles 61 Calif
Crouse-Hinds Co Syracuse 1 N Y
CROWN—Miller Co
Crown Industrial Products Co 713 Amsterdam St Woodstock Ill
Crownlite Fluorescent Co 7 Roselle St Mineola N Y
Crozier Machine Tool Co 684 N Prairie Av Hawthorne Calif
Crucible Steel Co of America Oliver Bldg Mellon Sq Pittsburgh 22 Pa
CRYSTAL—Royal Electric Corp
CRYSTAL VALVE—Delta-Star Electric Div
CRYSTALIER—Duro-Test Corp
CRYSTOPAL—Corning Glass Works
CUAL-AID—Penn-Union Electric Corp
Cummins-Chicago Corp—see Cummins Portable Tools Div John Oster Mfg Co
Cummins Portable Tool Div John Oster Mfg Co 5055 N Lydell Ave Milwaukee 17 Wis
CUPSON—Driver (Wilbur B) Co
Curran Engineering Co—see So-Cal Electro Products Inc
CURRENTROL—Lincoln Electric Co
CURTAIN OF LIGHT—Electronic Control Corp
CURTICELL—Curtis Lighting Div
Curtis Development & Mfg Co 3244 N 33 St Milwaukee 16 Wis
Curtis Lighting Div Curtis-All Brite Lighting Inc 6135 W 65 St Chicago 38 Ill
Curtis Lighting Inc—see Curtis Lighting Div
Curtis Mfg Co Refrigeration Div 1905 Kienlen Ave St Louis 20 Mo
CURTISTRIP—Curtis Lighting Div Curtis-All Brite Lighting Inc
CURVACORE—Allis-Chalmers Mfg Co
CURVETTE—Steber Mfg Co
Curvlite Surgical Products Co—see Mastercraft Plastics Co Inc
CUTAWL—International Register Co
Cutler Electrical Products Inc 5524 Haverford Ave Philadelphia Pa
Cutler-Hammer Inc 228 N 12th St Milwaukee 1 Wis
Cutler Industries Inc—see Cutler Light Mfg Co
Cutler Light Mfg Co 2026 N 22 St Phila 21 Pa
Cutler Sign Advertising Co—see Cutler Light Mfg Co
CYBERMOTOVE—Dalmotor Co
CYBERMOTEV—Dalmotor Co
CYCLO-CORE—New England Carbide Tool Co Inc
CYCLO-MONITOR—Counter & Control Corp
CYCLO-TWIST—New England Carbide Tool Co Inc
CYCLOHM—Howard Industries Inc
CYCLONE—Chisholm-Moore Hoist Div Columbus McKinnon Chain Corp
CYCLONE—Scranton Storage Battery Corp
CYLENT—Brook Motor Corp

D

D H D—Diamond Expansion Bolt Co Inc
DL—Derrick Light & Equipment Co
DPR Inc—see Hardman (H V) Co Inc
D & R Ltd 402 E Gutierrez St PO Box 1500 Santa Barbara Calif
DTX—Diamond Wire & Cable Co
DA-N-NITE—Premax Products Div Chisholm-Ryder Co Inc
Dage Television Div Thompson Products Inc Michigan City Ind
DAGLAS—Phelps Dodge Copper Products Corp
DAISY—American Pulley Co
Dake Corp 724 Robbins Rd Grand Haven Mich
Dake Engine Co—see Dake Corp
Dalmotor Co 1375 Clay St Santa Clara Calif
Dalmotron Co 534 Laurel St San Carlos Calif
Dalton Electric Heating Co 11 Goodhue St Salem Mass
DAMCO—Murray (D A) Co Inc
DAMPCOAT—Wilbur & Williams Co
Dampp-Chaser Inc 1440 Ridgewood Blvd Hendersonville N C
Dana Fan & Blower Corp 2644 Colerain Ave Cincinnati 14 Ohio
Dante Electric Mfg Co Bantam Conn
DARAY—Lightolier Inc
DART DRILL—Arro Expansion Bolt Co
DATA MATRIX—Dialight Corp
DATA STRIP—Dialight Corp
DATALITE—Dialight Corp
Davenport Mfg Co 2532 N Elston Ave Chicago 47 Ill
DAVEY—Vibrascope Co
Davids Gloves Inc 21 W Pleasant St Springfield Ohio
Davidson Fan Co 213 California St Newton 58 Mass
Davis (Dean W) Co—see Dormeyer Industries
Davis Electric Co 28 Parker St Wallingford Conn
Davis Mfg Co Inc 1500 S Mclean Blvd Wichita Kans
Day-Brite Lighting Inc 6260 N Broadway St Louis 15 Mo
DAY-LINE—Day-Brite Lighting Inc
Day-Ray Products Inc 1133 Mission St South Pasadena Calif
DALANITE—Price Bros Inc
DAYLUME—Day-Brite Lighting Inc
DAYSTAR—Lighting Products Inc
Daystrom Inc Weston Instruments Div 614 Frelinghuysen Ave Newark 12 N J
Dayton Electric Laboratory—see Delco Products Div General Motors Corp
Dayton Electric Mfg Co 126 S Oakley Blvd Chicago 12 Ill
Dayton Industrial Products Co Melrose Park Ill
Dayton Precision Mfg Co 213 N Beckel St Dayton 3 Ohio
Dayton Pump & Mfg Co—Taitco Div Tait Mfg Co
Dayton Safety Ladder Co 2337 Gilbert Ave Cincinnati 6 Ohio
DAZIC—Winterburn Mfg Co
DE-FROST-IT—Paragon Electric Co
DE-ION—Westinghouse Electric Corp
DE-LUXE—Premax Products Div Chisholm-Ryder Co Inc
DEAN—Solar Light Mfg Co
DeBothezat Fans Div American Machine & Metals Inc East Moline Ill
DECALS—Chicago Decalcomania Co
DECORALITE—Miller Co
DECROLITE—Westinghouse Electric Corp Lamp Div
DEFENSE LIGHT—Electric Cord Co
DeJur-Amsco Corp 4501 Northern Blvd Long Island City 1 N Y
DEKORON—Republic Steel Corp
Delco Products Div General Motors Corp 329 E 1st St Dayton 1 Ohio
Delta Chemical Works Inc 23 W 60 St New York 23 N Y
Delta-Star Electric Co—see Delta-Star Electric Div
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill
Delta-Star Electric Div Hill Transformer Works H K Porter Co Inc 1030 Washington St San Carlos Calif
DELTABESTON—General Electric Co
DELUXE SECRETARIAL—Linemaster Switch Corp
DEMKOTE—Dayton Electric Mfg Co
DENEL—Electric Cord Co
Denison (R B) Mfg Co 386 Broadway Bedford Ohio
DENSHEATH—Anaconda Wire & Cable Co
DENSITROL—Precision Thermometer & Instrument Co
DENTROL—Anaconda Wire & Cable Co
DEPEND-A-TROL—Acro Switch Div
Dependable-Electric Mfg Co Inc 537 Johnson Ave Brooklyn 37 N Y
DERBY—Day-Brite Lighting Inc
DERNGOOD—Snyder (M L) & Son Inc
Derrick Light & Equipment Co 1201 E Daggett (PO Box 414) Fort Worth Tex
DERRICK LIGHT INC—Derrick Light & Equipment Co
DESIGNER GROUP—Curtis Lighting Div
DESPARD—Pass & Seymour Inc
Despatch Oven Co 619 S E 8th St Minneapolis 14 Minn
DETECT-A-FIRE—Fenwal Inc
DETECT-A-FLO—Fenwal Inc
DETECTA-FAZE—Glo-Lite Instrument Co
DETECTO-LITE—Eagle Electric Mfg Co Inc
DETERMOHN—Ohmite Mfg Co
Detroit Controls Div American-Standard 5900 Trumbull Ave Detroit 8 Mich
Detroit Electric Furnace Div Kuhlman Electric Co Bay City Mich
Detroit Hoist & Machine Co 8292 Morrow St Detroit 11 Mich
Detroit Industrial Products Co—see Gardner Products Co
Detroit Lubricator Co—see Detroit Controls Div American-Standard
Detroit Sheet Metal Co—see Young Bros Co

Detroit Sintered Metal Corp—see Bunting Brass & Bronze Co
DETROITER—Detroit Hoist & Machine Co
DeVilbiss Co 300 Phillips Ave Toledo 1 Ohio
DeWalt Div American Machine & Foundry Co Fountain Ave Lancaster Pa
DeWalt Inc—see DeWalt Div American Machine & Foundry Co
DeWalt Products Corp—see DeWalt Div American Machine & Foundry Co
DEXTRA LITE—Swivelier Co Inc
DI-ACRO—O'Neil-Irwin Mfg Co
DI-EL-ITE—Everett (E A) Inc
DI-EN-KEY—Diamond Expansion Bolt Co Inc
DI-FORGE—Diamond Expansion Bolt Co Inc
DI-STAMPT—Diamond Expansion Bolt Co Inc
DIACTOR—General Electric Co
DIAL-A-FLO—General Control Co
DIAL-IN—Auth Electric Co Inc
DIAL SAW—Erwood Inc
DIALCLOR—Sangamo Electric Co
DIALCO—Dialight Corp
Dialight Corp 60 Stewart Ave Brooklyn 37 N Y
DIAMALLOY—Diamond Tool and Horseshoe Co
DIAMIDE—Diamond Expansion Bolt Co Inc
DIAMOND—Cannon Electric Co
DIAMOND—Eagle Electric Mfg Co Inc
Diamond Calk Horseshoe Co—see Diamond Tool and Horseshoe Co
DIAMOND-D—Co-operative Utilities Co Inc
DIAMOND F—Federal Lighting Corp
DIAMOND-H—Hart Mfg Co
Diamond Expansion Bolt Co Inc Garwood N J
Diamond Power Specialty Corp P O Box 415 Lancaster Ohio
DIAMOND SEAL—Snyder (M L) & Son Inc
Diamond Tool and Horseshoe Co 4702 Grand Ave Duluth 7 Minn
Diamond Wire & Cable Co 445 Park Ave Sycamore Ill
DIAN-IN—Auth Electric Co Inc
Dice (J W) Co Englewood N J
Dicke Tool Co 1201 Warren Ave Downers Grove Ill
Dickey-Grabler Co 10302 Madison Ave Cleveland 2 Ohio
Diehl Mfg Co 1187 Finderne Ave Somerville N J
Dietz (Henry G) Co Inc 12-16 Astoria Blvd Long Island City 2 N Y
DIFFUSO—Appleton Electric Co
DIGIMOTOR—Leland (G H) Inc
DIGITRONIC—Weltronic Co
DIM-A-LITE—Minneapolis-Honeywell Regulator Co
Dings Brakes Inc 4740 W Electric Ave Milwaukee 46 Wis
DIP-PAK—Fidelity Chemical Products Corp
DIRECT-A-CALL—Simpson Mfg Co Inc
DIRECTOLITE—Line Material Industries
DIRECTOR—Industrial Lamp Corp
DIRECTROL—Automatic Control Co
DIRECTRON—Miller (Sanford) Co
DISCOVERER—York Div Borg-Warner Corp
DISINFECTAIRE—Art Metal Co
DISKONECT—Appleton Electric Co
DISPLAYOLITE—Ruby-Philite Corp
Distribution & High Line Specialties Co 2100 Del Norte St Louis 17 Mo
DITCH MIDGET—Mercury Hydraulics
DITCH WITCH—Charles Machine Works Inc
DIVCO—Division Lead Co
DIVIDOHM—Ohmite Mfg Co
Division Lead Co 7742 W 61st Place Summit Ill
Dixie Controller Inc Post Office Box 5844 Birmingham 9 Ala
Dixie Electrical Mfg Co P O Box 745 Birmingham Ala
Dixie Radiant Glassheat Co—see Dixie Raydiant Electric Heat Corp
DIXIE RAY—Dixie Raydiant Electric Heat Corp
Dixie Raydiant Electric Heat Corp 66 Eleventh St N E Atlanta 9 Ga
Djeco Div Djordjevic Engineering Co 1933 N Damen Ave Chicago 47 Ill
DO-ALL—Cable Electric Tool Corp
DO-ALL—Wodack Electric Tool Corp
DOC—All-State Welding Alloys Co Inc
Dockson Corp 3839 Wabash Ave Detroit 8 Mich
Doelcam Corp—see Minneapolis-Honeywell Co Boston Div
Dolph (John C) Co Monmouth Junction N J
DOME ALZAK—Guth (Edwin F) Co
DOMELITE—Miroflector Co Inc
DOMEX—Lightolier Inc
Dominion Electric Corp 150 Elm St Mansfield Ohio
Dongan Electric Mfg Co 2987-3001 Franklin St Detroit 7 Mich
DONUT—Associated Research Inc
DONWOOD—Sierra Electric Corp
Doors & Operators Inc—see Quincy Mfg Co
Dormeyer Industries 3418 Milwaukee Ave Chicago 41 Ill
Dorsey (John E) Co 570 E First St Boston 27 Mass
DOS-LUG—Dossert Mfg Corp
DOSLOY—Dossert Mfg Corp
Dossert Mfg Corp 249-255 Huron St Brooklyn 22 N Y
DOSSON—Dossert Mfg Corp
DOSTEX—Dossert Mfg Corp
DOSULON—Dossert Mfg Corp
DOUBLE-DIAMOND—H-B Instrument Co
DOUBLE ENGINEERED—Metalectrics Inc
DOUBLE-KOOL—Hastings Air Conditioning Co Inc
DOUBLENCLOSED—U S Electrical Motors Inc
DOUBLEX—Johns-Manville
Dow Corning Corp Midland Mich
DOWNLITE—Rambusch Decorating Co
Doyle (J E) Co 1220 W 6th St Cleveland 13 Ohio
Doyle Electric Dryer—see Doyle (J E) Co
Doyle Vacuum Cleaner Co 234 Stevens St S W Grand Rapids Mich
DRACO—Versen (Kurt) Co
Drake Mfg Co 4626 N Olcott Harwood Heights Chicago 31 Ill
DRAMALITE—Centrury Lighting Inc
DREADNAUGHT—Metalcraft Products Co Inc
Dreier Brothers Inc 7301 Woodlawn Ave Chicago 19 Ill
DREXEL—Keystone Electric Mfg Co
DRI-FILM—General Electric Co
DRI-LOK—Jefferson Electric Co
DRI QUIK—Dry Clime Lamp Corp
DRI-TRAN—Land-Air Inc
DRILFAST—U S Expansion Bolt Co
DRILL-HAMMER—Rawlplug Co Inc
DRITHERM—North American Electric Lamp Co
DRIVE POINT—Hubbard & Co
Driver (Wilbur B) Co 1875 McCarter Highway Newark 4 N J
DRUM KING—American Pulley Co
Dry Clime Lamp Corp Greensburg Ind
DRY-EX—Acme Industries Inc
DRYGALV—American Solder & Flux Co
DRYMASTER—Dryomatic Corp
Dryomatic Corp 806 N Fairfax St Alexandria Va
DRYVIN—Star Expansion
DU-OP—General Control Co
DUA-LITE—Curtis Lighting Div
DUAFUEL—Nordberg Mfg Co
DUAL ARC—Electric Arc Inc
DUAL-BEAM—Cable Electric Products Inc
DUAL-FIN—Electrovector Inc
DUAL GRIP—Weaver (J A) Co
DUAL-HEAT—Jensen Inc
DUAL LITE—Mechanical Industries Production Co
Dual-Lite Co Inc Newtown Conn
DUALCOTE—Walker Brothers
DUALENS—Garcy Lighting Div—Garden City Plating & Mfg Co
DUALTRONIC—Goldak Co Inc
DUB-L-PLUG—Superior Electric Co
DuBois Electric Storage Battery Co 500 W DuBois Ave DuBois Pa
DUCK-VAR—Electro-Technical Products Div
DUCT-FREE—Broan Mfg Co Inc
DUCTATHERM—Mercoid Corp
Duff-Norton Co P O Box 1889 Pittsburgh 30 Pa
DuKane Corp St Charles Ill
Dumore Co 1300 17th St Racine Wis
DUMPER—Allied Mfg & Sales Co
DUNCO—Struthers-Dunn Inc
Dunton (M W) Co 350 Kinsley Ave Providence R I
DUO-FRAME—Day-Brite Lighting Inc
DUO-JOBMASTER—Ramset Fastening System
DUOCARB—Driver (Wilbur B) Co
DUOCONE—Lightolier Inc
DUOLET—Millerbernd Mfg Co
DUPLEX—Newark District Telegraph Co
DURA CRIMP—Anderson Electric Corp
Dura Electric Lamp Co Inc 62 E Bigelow St Newark 8 N J
DURA GRIP—Anderson Electric Corp
DURA LUG—Anderson Electric Corp
DURA-TEMP—General Blower Co
DURA WELD—Anderson Electric Corp
DURABAKE—S & C Electric Co
DURABLE—Seager Standard Carbon Co
DURAC—H-B Instrument Co
DURACODE—Anaconda Wire & Cable Co
DURACORD—Anaconda Wire & Cable Co
DURALEER—Duray Fluorescent Mfg Co
DURALINE—Anaconda Wire & Cable Co
Duralite Lanterns Inc 163 Long Beach Rd Island Park N Y
DURALOX—Anaconda Wire & Cable Co
DURAMATIC—Dura Electric Lamp Co Inc
Durant Mfg Co 1900 N Buffum St Milwaukee 1 Wis
DURAPRENE—Anaconda Wire & Cable Co
DURASEAL—Anaconda Wire & Cable Co
DURASHEATH—Aanaconda Wire & Cable Co
DURATACH—Wheeler Reflector Co
DURATRAK—General Radio Co
Duray Fluorescent Mfg Co 3318 W Montrose Ave Chicago 18 Ill
DUREX—Duro-Test Corp
DUREX—Wheeler Reflector Co
DURIUM—Burndy Corp
DURO-BITE—Duro Fittings Co
Duro Fittings Co 2210 S Davie Ave Los Angeles 22 Calif
DURO-HUB—Duro Fittings Co
DURO-LET—Duro Fittings Co
Duro Metal Products Co Kildare & Schubert Sts Chicago Ill
Duro-Test Corp 2321 Hudson Blvd North Bergen N J
DUROC—Scranton Storage Battery Corp
Durolet Mfg Co—see Red Seal Electric Co
DUSTFOE—Mine Safety Appliances Co
DUSTITE—Adam (Frank) Electric Co
DUTCH BOY—National Lead Co
Dutch Brand Div Johns-Manville 7800 S Woodlawn Ave Chicago 19 Ill
DUTRAX—Anaconda Wire & Cable Co
DUWEL—Electro Engineering Products Co Inc
DUZ-ALL—Siebring Mfg Co
Dwyer (F W) Mfg Co Woodland at Greenwood (PO Box 373) Michigan City Ind
DYMODRILL—Milwaukee Electric Tool Corp
DYN-AUT-RONIC—Gisholt Machine Co
DYNACHROME—Whitney Blake Co
DYNAMOTIVE—Automatic Transportation Co
DYNAPOWER—Carol Cable Co
DYNAPOWER—Crescent Co Inc
DYNAPRENE—Whitney Blake Co
DYNASEAL—Whitney Blake Co
Dynaseal Lighting Corp 5 Hadley St Cambridge 40 Mass
DYNATACH—Electric Tachometer Corp
DYNATROL—Automation Products Inc
DYNETRIC—Gisholt Machine Co
DYNETRIC—Westinghouse Electric Corp
DYNOGRAPH—Annis (R B) Co
DYROSEC—Kaiser Aluminum & Chemical Sales Inc

E

E-LITE—Guth (Edwin F) Co
EC&M—Electric Controller & Mfg Co
E J S Lighting Corp 321 E Pico Blvd Los Angeles 21 Calif
EMC—Howard Industries Inc
ETC Inc 990 E 67 St Cleveland 3 Ohio
EZ—Henderson Electric Co
E-Z—Penn-Union Electric Corp
E-Z CODE—Westline Products Div Western Lithograph Co
E-Z CUTTER—Collins Machinery Corp
E-Z MARK—Crown Industrial Products Co
EZ SERVICER—Wiley (R & W) Inc
E-Z STRIPPER—Ideal Industries Inc
E-Z TALK—Simpson (Mark) Mfg Co Inc
EAGALINE—Eagle Electric Mfg Co Inc
EAGALOK—Eagle Electric Mfg Co Inc
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 N Y
Eagle Mfg Co 3508 Avalon Blvd Los Angeles 11 Calif
Eagle-Picher Co American Building Cincinnati 1 Ohio
Eagle Plastics Co—see Eagle Electric Mfg Co Inc
Earl (H W) & Co 6225 S W 8th St Miami 44 Fla
Earl Electric Mfg Corp 35-20 Borden Ave Long Island City N Y
Early (Edward E) Co 1129 5th St N W Canton 3 Ohio
Easco Products Inc P O Box 587 Ypsilanti Mich
EASTERN—Circle F Mfg Co
Eastern Specialty Co 3617 N 8th St Phila 40 Pa
Eastern Tube & Tool Co Inc—see Ettco Wire & Cable Corp
EASTEX—Circle F Mfg Co
Easy-Heat Inc 555 N Michigan St Lakeville Ind
EASY TACH—Quadrangle Mfg Co
EASY WIRE—Gem Electric Mfg Co Inc
Ebco Mfg Co 265 N Hamilton Rd Columbus 13 Ohio
Ebert Electronics Corp 212-26 Jamaica Ave Queens Village 28 L I N Y
ECLIPSE—Frick Co
ECLIPSE—Sperti Faraday Inc
ECOA—Equipment Corp of America
ECON—Economy Fuse Div
ECON-O-MATIC—American Pulley Co
ECON-O-MIZER—Acme Industries Inc
ECONO-STAKE—Duro Fittings Co
ECONO-WATT—Redmond Co Inc
ECONOMY—Arex Co
ECONICOM—Simpson (Mark) Mfg Co Inc
ECONOFONE—Simpson (Mark) Mfg Co Inc
ECONOLINE—Duro Fittings Co
ECONOMY—Coates Electric Mfg Co
ECONOMY—Keystone Electric Mfg Co
Economy Engineering Co 4511 West Lake St Chicago 24 Ill
Economy Fuse & Mfg Co—see Economy Fuse Div
Economy Fuse Div Federal Pacific Electric Co 2717 N Greenview Ave Chicago 14 Ill
EDCO—Eynon-Dakin Co
Edco International Corp 20722 W Seven Mile Road Detroit 19 Mich
EDDYMAG—Electric Controller & Mfg Co
Ederer Engineering Co 2943 1st Ave S Seattle 4 Wash
EDGE-GLO—Curtis Lighting Div
Edison Heatube Div—see Heatube Dept
Edison (Thomas A) Industries McGraw-Edison Co Storage Battery Div West Orange N J
Edmor Lamp Co Inc 1867 Flatbush Ave Brooklyn 10 N Y
EDUCATOR—Lighting Products Inc
Edwards Co Inc Norwalk Conn
EECO—Marvin Electric Mfg Co
EFCOR—Electrical Fittings Corp
EFCORLET—Electrical Fittings Corp
Efficiency Elecctric & Mfg Co Park Ave Ext P O Box 30 East Palestine Ohio
EFFICO—Hirschman-Pohle Co Inc
Eicor Div F L Jacobs Co 4235 W North Ave Chicago 39 Ill
Eicor Inc—see Eicor Div
Eisenstat (David)—see Metalectrics Inc
Eisler Engineering Co Inc 750 S 13 St Newark 3 N J
EITHEREND—Anderson (Albert & J M) Mfg Co
EKTACOM—Fisher Berkeley Corp
ELBENDERS—Henderson Electric Co
ELBOLIFT—Automatic Transportation Co
Eldon Industries Inc Electronic Div 4101 Redwood Ave Los Angeles 66 Calif
ELEC-TROL-FEED—Delta-Star Electric Div
ELECTR-O-LINE—Minneapolis-Honeywell Regulator Co Industrial Div
ELECTR-O-PULSE—Minneapolis-Honeywell Regulator Co Industrial Div
ELECTR-O-VANE—Minneapolis-Honeywell Regulator Co Industrial Div

ELECTR-O-VOLT—Minneapolis-Honeywell Regulator Co
Electra Mfg Co 4051 Broadway Kansas City Mo
Electra Motors Inc 1110 N Lemon St Anaheim Calif
Electran Mfg Co 1901 Clybourn Ave Chicago 14 Ill
Electrend Products Corp State & Water Sts (Box 110) St Joseph Mich
ELECTRESTEEM—Electric Steam Radiator Corp
ELECTRI-CENTER—BullDog Electric Products Div I-T-E Circuit Breaker Co
Electri-Cord Mfg Co Inc 2554-2568 E 18 St Brooklyn 35 N Y
Electri-Flex Co Roselle Ill
Electric Arc Inc 152 Jelliff Ave Newark 8 N Y
Electric Boat Co—see Electro Dynamic Div General Dynamics Corp
Electric Controller & Mfg Co 4493 Lee Rd Cleveland 28 Ohio
Electric Cord Co 432 Plane St Newark 2 N J
Electric Deodorizer Corp—see Edco International Corp
Electric Distribution Products Inc 2200 31st St S W Allentown Pa
ELECTRIC DOORMAN—Electric Power Door Co
ELECTRIC FLOWER—Aerolux Lights Corp
Electric Heating Products Inc—see Everwarm Inc
Electric Hose & Rubber Co 12th & Dure Sts Wilmington Dela
Electric Hotpack Co Inc Cottman Ave at Melrose St Phila 35 Pa
Electric Indicator Co Inc Camp Ave Springdale Conn
Electric Jobbers Suppliers Corp—see EJS Lighting Corp
Electric Lighting Sales Inc P O Box 1907 Stockton Calif
ELECTRIC-LUMINUS—Luminous Ceilings Inc
Electric Machinery Mfg Co 800 Central Ave Minneapolis 13 Minn
Electric Materials Co Box 390 North East Pa
Electric Motor Corp—see Howard Industries Inc
Electric Motors & Specialties Inc King & Hamsher Sts Garrett Ind
Electric Power Door Co 2127 E Lake St Minneapolis 7 Minn
Electric Power Plants Corp Buffalo St Cadiz Ohio
Electric Products Co 1725 Clarkstone Rd Cleveland 12 Ohio
Electric Railway Equipment Co—see Elreco Corp
Electric Railway Improvement Co—see Erico Products Inc
Electric Regulator Corp Norwalk Conn
Electric Re-Light Co 625 So Goodman St Rochester 20 N Y
Electric Service Co see Delta-Star Electric Div H K Porter Co Inc
Electric Service Systems Inc 1330 Quincy St N E Minneapolis 13 Minn
Electric Soldering Iron Co Inc West Elm St Deep River Conn
Electric Specialty Co 211 South St Stamford Conn
Electric Steam Radiator Corp 1 Electric Ave Paris Ky
Electric Storage Battery Co Wisco Div 1222 18th St Racine Wis
Electric Switch Corp 2320 S Tibbs Ave (P O Box 41037) Indianapolis 41 Ind
Electric Tachometer Corp 68th & Upland Sts Phila 42 Pa
Electric Tube Products 74-16 Grand Ave Maspeth N Y
Electrical Engineers Equipment Co 25th Ave & Division St Melrose Park Ill
Electrical Facilities Inc—see Knopp Inc
Electrical Fittings Corp 37-50 57th St Woodside 77 N Y
Electrical Mfg Co 425 Lake Ave Racine Wis
Electrical Windings Inc 2015 N Kolmar Ave Chicago 39 Ill
Electrical Service Co—see Esco Mfg Co
ELECTRICTUBE—Mark (Clayton) & Co
ELECTRIK—Minneapolis-Honeywell Regulator Co Industrial Div
ELECTRO—Dunton (M W) Co
Electro Compound Co 4145 W 150 St Cleveland 35 Ohio
ELECTRO-COOLER—Allis-Chalmers Mfg Co
Electro Devices Inc 4648 Easton Ave St Louis 13 Mo
Electro Devices Co Inc 580 Main St Wilmington Mass
Electro Dynamic Div General Dynamics Corp 163 Ave A Bayonne NJ
Electro Engineering Products Co Inc 609 W Lake St Chicago 6 Ill
Electro Engineering Works 401 Preda St San Leandro Calif
ELECTRO-LARM—Electro Devices Inc
Electro Lift Inc 204 Sargeant Ave Clifton N J
Electro Lighting Corp 1535 Paulina St Chicago 8 Ill
Electro Luminaire Corp—see Electro Lighting Corp
ELECTRO MAT—Interstate Rubber Products Corp
Electro Mechanical Devices Co—see Nankervis (Geo L) Co
Electro-Mechanical Instrument Co 8th & Chestnut Sts Perkasie Pa
Electro-Mechano Co 241 E Erie St (EM) Milwaukee 2 Wis
ELECTRO-PANE—Electro Devices Inc
ELECTRO-PROBE—Erwood Inc
Electro-Products Mfg Co 8310 N E Highway 99 Vancouver Wash
ELECTRO-RAY—Electro-Products Mfg Co
Electro-Ray Mfg Co 8310 N E Highway 99 Vancouver Wash
ELECTRO-SHEAVE—Warner Electric Brake & Clutch Co
Electro Silv-A-King Corp—see Electro Lighting Corp
Electro-Technical Products Div Sun Chemical Corp 113 E Centre St Nutley 10 N J
Electroflow Inc—see American Electronics Inc
ELECTROFLUID—Link-Belt Co
ELECTROLETS—Killark Electric Mfg Co
Electroline Mfg Co 2622 E 51st St Cleveland 4 Ohio
Electromaid Corp—see Can Arm Corp
ELECTROMATIC—National Time & Signal Corp
ELECTROMATIC—Siebring Mfg Co
Electromode Div Commercial Controls Corp P O Box 1052 Rochester 3 N Y
ELECTRONIC BUTLER—Simpson (Mark) Mfg Co Inc
Electronic Center—see Dalmotron Co
Electronic Control Corp 1573 E Forest Ave Detroit 7 Mich
Electronic Measurements Co Inc Lewis St & Maple Ave Eatontown N J
ELECTRONIC WITCH—Fisher Research Laboratory Inc
Electronics Corp of America One Memorial Dr Cambridge Mass
ELECTRONIK—Minneapolis-Honeywell Regulator Co Industrial Div
ELECTROPULT—Westinghouse Electric Corp
ELECTROSTART—Lake Shore Electric Corp
ELECTROSTRIP—BullDog Electric Products Div I-T-E Circuit Breaker Co
Electrovector Inc 475 Flushing Ave Brooklyn 5 N Y
Electrovert Inc 124 E 40 St New York 16 N Y
ELECTROWELD—Electric Arc Inc
ELECTROX—Schauer Mfg Corp
ELECTRUNITE—Republic Steel Corp
ELEGANCE—White-Rodgers Co
ELEMEX—Line Material Industries
ELFCO—Everglow Lighting Fixture Co Inc
Elgin National Watch Co Electronics Div 2435 N Naomi St Burbank Calif
ELIED—Farrelloy Co
ELINCO—Electric Indicator Co Inc
ELIPSO—Appleton Electric Co
ELIPTICONE—Art Metal Co
ELIPTISQUARE—Art Metal Co
ELIPTOR—Revere Electric Mfg Co
Elite Glass Co Inc 111 W 22nd St New York 11 N Y
Elite Import Co—see Elite Glass Co Inc
Eliza Metal Products Co Box 408 Bridgeville Pa
ELJAY—Segil (L J) Co
ELKOLOY—Mallory (P R) & Co Inc
ELKONITE—Mallory (P R) & Co Inc
ELKONIUM—Mallory (P R) & Co Inc
Ellanar Chemical Co—see London Chemical Co Inc
ELLARM—Ellenco Inc
ELLBELL—Ellenco Inc
Ellenco Inc 3322 M St N W Washington 7 D C
Elliott Co Jeannette Pa
Elliott Electric Products Co 1513 Olmstead Ave New York 62 N Y
ELLIPTI-FLOOD—Electro Lighting Corp
ELLITE—Ellenco Inc
Ellman Co—see Ellenco Inc
Ellmann Engineering Co—see Ellenco Inc
ELPAR—Elwell-Parker Electric Co
ELRAD—Westchester Brickote Products Co Inc
Elreco Corp 2000 Central Ave Cincinnati 14 Ohio
ELTAP—Burndy Corp
ELTEX—Electro-Technical Products Div Sun Chemical Corp
Elwell-Parker Electric Co 4319 St Clair Ave Cleveland 3 Ohio
EMCO—Earl Electric Mfg Corp
EMCO—Ender-Monarch Corp
EMD-COM—Wing (L J) Mfg Co
EMERSON—Quiet-Heet Mfg Corp
Emerson Electric Mfg Co 8100 Florissant Ave St Louis 21 Mo
Emerson-Imperial Lighting Co Loyalhanna Park Latrobe Pa
Emerson Plastics Corp 1383 Seabury Ave Bronx 61 N Y
Emerson-Pryne Co Towne Ave at Monterey (P O Box 698) Pomona Calif
Emerson-Quiet Kool Corp—see Quiet-Heet Mfg Corp
Emhart Mfg Co Skyworker Div 760 Windsor St Hartford 1 Wis
EMICO—Electro-Mechanical Instrument Co
EMPIRE—Cam-Lok Div Empire Products Inc
EMPIRE—Diamond Expansion Bolt Co Inc
Empire Corp 1566 S 83rd St Milwaukee 14 Wis
Empire Products Inc—Cam-Lok Div Empire Products Inc
Enameled Metals Co—see Pittsburgh Standard Conduit Co
ENAMELITE—Republic Steel Corp
ENAMELKOTE—Mark (Clayton) & Co
Ender-Monarch Corp 141 Lanza Ave Garfield NJ
ENDOVAL—Revere Electric Mfg Co
ENDULATOR—Rusgreen Mfg Co
ENDURITE—Crescent Insulated Wire & Cable Co
ENDURPRENE—General Insulated Wire Works Inc
Engelhard (Charles) Inc 850 Passaic Ave East Newark NJ
Engelhard Industries Inc 113 Astor St Newark 5 NJ
ENGINATORS—Waukesha Motor Co
ENPO—Piqua Machine & Mfg Co
ENTERITE—General Cable Corp
ENVOY—Keystone Electric Mfg Co
EONITE—Kaiser Aluminum & Chemical Sales Inc
EPCO Electronics Inc 140 Liberty St NY 6 NY
EPI-GLAS—Electro-Technical Products Div
EPOSET—Hardman (H V) Co Inc
Equipment Corp of America 1537 Superior Ave Cleveland 14 Ohio
ERECT-A-LIFT—Allied Mfg & Sales Co
ERICKSON—Thomas & Betts Co
Erickson Power Lift Trucks Inc St Anthony Blvd & University Ave N E Minneapolis 18 Minn
Erickson Special Equipment Mfg Co—see Erickson Power Lift Trucks Inc
Erico Products Inc 2070 E 61 Place Cleveland 3 Ohio
Ericson Mfg Co 1660 Hayden Ave Cleveland 12 Ohio
Erie Glass Mfg Co 564 Union Trust Bldg Pittsburgh 19 Pa
Erie Malleable Iron Co Kondu Div—see Kondu Corp
Erie Sales & Mfg Co—see Erie Glass Mfg Co
Erie Tool Works 12th & Liberty Sts Erie Pa
Erwood Inc 1770 Berteau Ave Chicago 13 Ill
ESCO—Electric Specialty Co
Esco Mfg Co P O Box 1039 Greenville Tex
ESCORT—Stevens Appliance Truck Co
ESICO—Electric Soldering Iron Co Inc
ESS—Electric Service Systems Inc
Ess Instrument Company—see Photomation Inc
Ess Specialty Co—see Photomation Inc
Essex Wire Corp Wire & Cable Div 2601 S Adams Marion Ind
ESSTRON—Electric Service Systems Inc
ESTANE—Goodrich (B F) Chemical Co
Esterline-Angus Co P O Box 596 Indianapolis 6 Ind
Esty Mfg Co 112 S Sangamon St Chicago 7 Ill
ETTCO-FLEX—Ettco Wire & Cable Corp
ETTCO-PLASTIC—Ettco Wire & Cable Corp
Ettco Wire & Cable Corp 75 Onderdonk Ave Brooklyn 37 NY
Euclid Electric & Mfg Co 50 Edwards St Madison Ohio
EUREKA—Morse (Frank W) Co
EVANOHM—Driver (Wilbur B) Co
EVER-LOK—Russell & Stoll Co Inc
EVEREADY—National Carbon Co
Everett (E A) Inc 33-15 56th St Woodside 77 NY
Everglow Lighting Fixture Co Inc 332 E Jericho Turnpike Huntington Station NY
EVERGREEN—Snyder (M L) & Son Inc
EVERLITE—Curtis Development & Mfg Co
Everwarm Inc 3600 Pleasant Ridge Rd Knoxville Tenn
Ewald Instruments Box 124P Kent Conn
Excel Electric Service Co Inc 2113 S Western Ave Chicago 8 Ill
Excel Fuse Co 117 W Erie St Pittsburgh 12 Pa
EXECUTIVE—Linemaster Switch Corp
Executone Inc 415 Lexington Ave NY 17 NY
EXFLEX—Lewis Engineering Co
Exmet Corp 127 Marbledale Rd (P O Box 485) Tuckahoe NY
Exide Industrial Div Electric Storage Battery Co Rising Sun & Adams Ave (P O Box 5723) Philadelphia 20 Pa
EXOLVE—Penetone Co
EXPANDER—Arro Expansion Bolt Co
EXPLOSIMETER—Mine Safety Appliances Co
EXTRAFLEX—Universal Metal Hose Co
EXTRUDO-LITE—Magni Flood Inc
EYE COMFORT—Curtis Lighting Div
EYE-EASY—Manning (RA) Co Inc
Eynon-Dakin Co 9900 Freeland Ave Detroit 27 Mich

F

FA—Adam (Frank) Electric Co
F & F—Trent Inc
F P—Mallory (P R) & Co Inc
F W D Corp 105 E 12 St Clintonville Wis
Fairbanks Co 393 Lafayette St NY 3 NY
Fairbanks Morse & Co 600 S Michigan Ave Chicago 5 Ill
FAIRLEADER—Barry (William B) Co
FAIRWAY—Day-Brite Lighting Inc
FALCON—Guth (Edwin F) Co
Falcon Equipment Co 13th St (Box E-255) New Brighton Pa
Falk Corp Box 492 Milwaukee 1 Wis
Falstrom Co 62 Falstrom Court Passaic NJ
FAMOUS—Goshen Churn & Ladder Inc
FAN-GLO HEETAIRE—Markel Electric Products Inc
FAN-PAC—DeBothezat Fans Div American Machine & Metal Co
FAN-PAC—General Blower Co
FANFARE—Fanon Electronic Industries Inc
Fanner Mfg Co Electric Products Div Brookside Park Cleveland 9 Ohio
Fannon (John J) Co 3000 E Woodbridge Detroit 7 Mich
Fanon Electric Co Inc—see Fanon Electronic Industries Inc
Fanon Electronic Industries Inc 439 Frelinghuysen Ave Newark NJ
Fanon Electronic Sales Corp—see Fanon Electronic Industries Inc
FANON-FONE—Fanon Electronic Industries Inc
FARADAY—Sperti Faraday Inc
FARADOID—Westinghouse Electric Corp
FARCO—Farrelloy Co
Fargo Mfg Co Inc 845 Main St Poughkeepsie NY
Faries Lamp Div—see AOW Corp
Faries Mfg Corp—see AOW Corp
Farmer Electric Co—see Farmer Electric Products Co Inc
Farmer Electric Products Co Inc 2300 Washington St Newton Lower Falls 62 Mass
FARMOTOR—Westinghouse Electric Corp
FARMSTARTER—Westinghouse Electric Corp
Farrelloy Co 1245 N 26th St Phila 21 Pa
FAS-TIN—Farrelloy Co
Fasco Industries Inc Davis & Toppin Sts Rochester 2 NY
Fasform Div Heller Roberts Mfg Corp 6115 Carnegie Ave Cleveland 1 Ohio

FASHION—White-Rodgers Co
FASHION PLATE—Bryant Electric Co
Fast-Lok Mfg Co Ash St at Bedford Bridgeport 5 Conn
FASTHOLD—Mitchell Rand Insulation Co
Fastway Fasteners Inc 1676 E 28 St Lorain Ohio
FATHOMETER—Raytheon Mfg Co
FAULTMASTER—Hubbard & Co
FEATHERLITE—Century Lighting Inc
FEATHERTOUCH—Theiler (H J) Corp
FEATHERWEIGHT—Goldak Co Inc
FEATHERWEIGHT—Wing (L J) Mfg Co
Fedders Corp 58-01 Grand Ave Maspeth NY
Fedders-Quigan Corp—see Fedders Corp
Federal Electric Co Inc—see Federal Sign & Signal Corp
Federal Electric Products Co—see Federal Pacific Electric Co
Federal Enterprises—see Federal Sign & Signal Corp
Federal Lighting Corp 1425 Rockwell Ave Cleveland 14 Ohio
Federal Lighting Div—see Federal Lighting Corp
Federal Machine & Welder Co 1745 Overland Ave N E Warren Ohio
Federal Pacific Electric Co 50 Paris St Newark 5 NJ
Federal Shock Mount Corp 1060 Washington Ave New York 56 NY
Federal Sign & Signal Corp 13626 S Western Ave Blue Island Ill
Federal Telephone and Radio Co—see ITT Components Div
Federated Metals Div American Smelting & Refining Co 120 Broadway New York 5 NY
FEED-IN—Square D Co
FEEDUCT—Columbia Metal Box Co
Feedrail Corp 125 Barclay St New York 7 NY
Feiler Engineering & Mfg Co 8026 N Monticello Ave Skokie Ill
Felco Products Inc 8700 Ambassador Row Dallas 19 Tex
FEMCO—Fluorescent Equipment & Mfg Co
Femco Inc Irwin Pa
FENCE-RITE—Electric Service Systems Inc
Fenwal Inc Pleasant St Ashland Mass
FERALOY—Crouse-Hinds Co
FERMONT—International Fermont Machinery Co Inc
Ferrara Inc—see Webster Electric Co
FERRIMAG—Crucible Steel Co of America
FERRUBRON—Carbolineum Wood Preserving Co
Fiber Conduit Co—see Orangeburg Mfg Co
FIBREMAT—Minnesota Mining & Mfg Co
FIBROID—Johns-Manville
FIBRPLUG—Star Expansion
Fidelity Chemical Products Corp 470 Frelinghuysen Ave Newark 12 NJ
Fidelity Electric Co Inc 332 N Arch St Lancaster Pa
FIEFLEX—Insulation Mfrs Corp
FILTAIRETTE—General Scientific Equipment Co
Finland House Lighting—see Litecraft Mfg Corp
FINROD—Tuttle & Kift Inc
Fire Alarm Thermostat Corp 53 W 23 St New York 10 NY
Fire Detective Inc 300 Chancellor Ave Newark 12 NJ
FIRE FUSE—Wind-Way Fan & Ventilator Co
FIREBAN—Taylor Fibre Co
FIREFLY—Northern Light Co
FIREYE—Electronics Corp Of America
FIRMA—Hirschman-Pohle Co Inc
First Lamp Corp—see Penetray Corp
Fischer & Porter Co 335 Warminster Rd Hatboro Pa
Fisher Berkeley Corp 4224 Holden St Emeryville Calif
Fisher-Pierce Co 170 Pearl St South Braintree 85 Mass
Fisher Research Laboratory Inc 1961 University Ave Palo Alto Calif
5-WAY—Superior Electric Co
FIXTURE FASHIONS—Moe Light Div Thomas Industries Inc
FLAME STOP—Phelps Dodge Copper Products Corp
FLAMENOL—General Electric Co
FLAMESCENT—Duro-Test Corp
FLASH-GLO—Tedcar Products Co
FLASHMASTER—Carpenter Mfg Co
FLAVOR SEAL—Fresh'nd-Aire Div Cory Corp
Fleron (M M) & Son 1220 Yardley Rd Morrisville Pa
Fletcher Mfg Co 302 E 2nd St Dayton 2 Ohio
Fleur-O-Lier Mfrs 2116 Keith Bldg Cleveland 15 Ohio
FLEX-A-PLUG—General Electric Co
FLEX-A-POWER—General Electric Co
FLEX-ARC—Westinghouse Electric Corp
FLEX-ARM—Woodward Machine Co
FLEX-FIT—Charleston Rubber Co
FLEX-LOCK—Keystone Electric Mfg Co
FLEX-SAF—Charleston Rubber Co
FLEX-SEAL—Columbia Cable & Electric Corp
FLEX-SHEAR—Marvel Rack Mfg Co Inc
FLEXACON—Hatfield Wire & Cable Div Continental Copper & Steel Industries Inc
FLEXALARM—Gamewell Co
FlexAngle Corp 3760 Oakwood Ave (P O Box 418) Youngstown 1 Ohio
FLEXARAY—Ouro-Test Corp
FLEXARM—Art Specialty Co
FLEXARM—Flexo International Corp
FLEXI-SWITCH—Nankervis (Geo L) Co
FLEXIFONE—DuKane Corp
FLEXIFORMER—Superior Electric Co
FLEXILUGS—Frankel Connector Co
FLEXITE—Markel (L Frank) & Sons
FLEXITORQ—Allis (Louis) Co
FLEXLAB—Standard Electric Time Co
FLEXLEAD—Markel (L Frank) & Sons
FLEXO—Art Specialty Co
Flexo International Corp 3720 N Milwaukee Ave Chicago 41 Ill
FLEXON—Flexonics Corp
Flexonics Corp 1430 S Third Ave Maywood Ill
FLEXSEAL—Columbia Cable & Electric Corp
FLEXSHIELD—American Electric Cable Co
FLEXSTEEL—National Electric Div H K Porter Co
FLEXSTEEL—Utilities Service Co
FLEXTUNG—Capewell Mfg Co
FLICKER-FLAME—Aerolux Lights Corp
FLIP-SEAL—Rodaie Mfg Co Inc
FLIP-TITE—Royal Electric Corp
FLIPON—Westinghouse Electric Corp
FLITE-CHEK—Ramset Fastening System
FLO-LINER—Wheeler Reflector Co
FLO-LITE—Burton Mfg Co
FLO-SIG—New Jersey Meter Co Inc
FLOOR MASTER—Lewis-Shepard Products Inc
FLORAFLOOD—Steber Mfg Co
FLORALAMP—Steber Mfg Co
FLORALITE—Steber Mfg Co
FLORDUCT—National Electric Div H K Porter Co
Flourescent Equipment Supply Co—see K-B Lighting Mfg Co
FLOUROLITE—K-B Lighting Mfg Co
FLOW-COLD—Acme Industries Inc
FLOW-MIZER—Acme Industries Inc
FLOW-PAC—Acme Industries Inc
FLOW-TEMP—Acme Industries Inc
FLOW-THERM—Acme Industries Inc
Flower (D B) Mfg Co 1217 Spring Garden St Philadelphia 23 Pa
Flower Mfg Co Inc—see Flower (D B) Mfg Co
FLOWER LIGHT—Aerolux Lights Corp
FLOWRATOR—Fischer & Porter Co
FLUD-LITE—Stanley Electric Tools
FLUID SHAFT—Reuland Electric Co
FLUO-LITER—Guth (Edwin F) Co
FLUOMERIC—Duro-Test Corp
FLUOR-DE-LE—Segil (L J) Co
FLUORDSINT—Polymer Corp
FLUOR-O-TESTER—Electric Re-Light Co
Fluores-O-Lite Co Evans Terminal North Broad St Hillside 5 NJ
FLUSHDUCT—National Electric Div H K Porter Co
Fluorescent Equipment & Mfg Co 5105 Cowan Ave Cleveland 27 Ohio
Fluorescent Fixtures of California 352 Shaw Rd South San Francisco Calif
FLUORESIGN—Reserve Electric Mfg Co
FLUR-O-LAMP—Laduby Co Inc
FLUR-O-LOCKS—Laduby Co Inc
FLUR-O-LUX—Fullerton Mfg Co
FLURO-SPRAY—Duro-Test Corp
FLUSH CALL—Edwards Co Inc
FLUSHLITES—Drake Mfg Co
FLUX-N-SOLDER—Johnson Mfg Co Inc
FLYING FARMER—Line Material Industries
FOAMFLEX—Phelps Dodge Copper Products Corp
FOAMLINE—Plastoid Corp
FOAMTUBE—Plastoid Corp
FOCALITE—Amplex Corp
FOCUS LOK—Westinghouse Electric Corp Lamp Div
FOLD-A-WAY—Patent Scaffolding Co Inc
Folsom Co Inc 3104 Oak Lane Dallas 26 Tex
FOOTROL—General Control Co
FORCE-FLO—Trane Co
FORLAMP—General Electric Co
FORMBOND—Belden Mfg Co
FORMEX—General Electric Co
FORMEZE—General Cable Corp
FORMLON—General Cable Corp
FORMVAR—Anaconda Wire & Cable Co
Forsberg Mfg Co 125 Seaview Ave Bridgeport 1 Conn
Forston Co 2117-2119 Judiway (P O Box 10231) Houston 18 Tex
FORTY-SIXTY—Curtis Lighting Div
FORWAY—U S Expansion Bolt Co
FOSTERITE—Westinghouse Electric Corp
Fostoria Pressed Steel Corp N Main St Fostoria Ohio
FOTA-LITE—Corning Glass Works
4 POINT—Nye Tool Co
FOUR-STAR—Johns-Manville
Four Wheel Drive Auto Co—see F W D Corp
Fox Gun Co—see Fox Products Co
Fox Products Co 4720 N 18 St Phila 41 Pa
FRAHM—Biddle (James G) Co
France Mfg Co 10325 Berea Rd Cleveland 2 Ohio
Francolite Co—see Federal Lighting Corp
Frankel Connector Co 27 Vestry St NY 13 NY
Franklin Electric Co Inc 400 E Spring St Bluffton Ind
FRANSFORMER—France Mfg Co
FREE-FLEX—Pines Engineering Co Inc
Fresh'nd Aire Co—see Fresh'nd-Aire Div Cory Corp
Fresh'nd-Aire Div Cory Corp 221 N LaSalle St Chicago Ill
Frick Co Waynesboro Pa
Frick-Gallagher Mfg Co 110 S Michigan Ave Wellston Ohio
FRIGI-START—Duro-Test Corp
Frigid Inc 128-168 32nd St Brooklyn 32 NY
Frigidaire Div General Motors Corp 300 Taylor St Dayton 1 Ohio
FRIGIDFLEX—Hatfield Wire & Cable Div Continental Copper & Steel Industries Inc
Frink Corp 211 63rd St Brooklyn 20 NY
Frisbie (HC) Co 1120 E Pico Blvd Los Angeles 21 Calif
FROG-LEG—Allis-Chalmers Mfg Co
FULL-O-LITE—Fullerton Mfg Co
FULL-O-PEP—Standard Electric Co Inc
Fullerton Mfg Co Willard Rd Norwalk Conn
Fullman Mfg Co 1209-1215 Jefferson St Latrobe Pa
Furnas Electric Co 1067 McKee St Batavia Ill
FUSETRON—Bussmann Mfg Div McGraw-Edison Co
FUSISTOR—S & C Electric Co
FUSTAT—Bussmann Mfg Div McGraw-Edison Co
FUTURA—Electro-Products Mfg Co
FUTURA—Metalcraft Products Co Inc
FUTURLITER—Guth (Edwin F) Co
FYBEROID—Wilmington Fibre Specialty Co
FYR-CRY—SAFA Alarm Div Fyr-Fyter Co
FYR-FYTER—SAFA Alarm Div Fyr-Fyter Co

G

GAC—General Alliance Corp
G-C Electronics Co 400 S Wyman St Rockford Ill
GE—General Electric Co
G-H—Girard Hopkins
GL—Lidseen of North Carolina Inc
GM Diesel 13400 W Outer Dr Detroit 28 Mich
GS—General Scientific Equipment Co
GSF—General Steel Fittings Co
GST—Guth (Edwin F) Co
G & W Electric Specialty Co 3500 W 127 St Blue Island Ill
G/W—Great Western Div
Gaffers & Sattler—see Mission Appliance Corp
Gaines Collins Co—see Collins Machinery Corp
GALV-KROM—Steel City Electric Co
GALVAKOTE—Mark (Clayton) & Co
Galvin Mfg Co—see Motorola Communications & Electronics Inc
GALVINOLEUM—Rust-Oleum Corp
GALVITE—Republic Steel Co
Gamewell Co Newton Upper Falls 64 Mass
GAR-LITE—Garcy Lighting Div Garden City Plating & Mfg Co
GAR-SEE-LITE—Garcy Lighting Div Garden City Plating & Mfg Co
GARAGE-LITE—Woodward Machine Co
Garcy Lighting Div Garden City Plating & Mfg Co 2475 Elston Ave Chicago 47 Ill
Garden City Fan Co—see Garden City Fan & Blower Co
Garden City Fan & Blower Co 801 N Eighth St Niles Mich
Garden City Plating & Mfg Co—see Garcy Lighting Div
GARDENLITE—Fostoria Pressed Steel Corp
GARDINER—Federated Metals Div American Smelting & Refining Co
Gardner Bender Co 5448 N 24 Pl Milwaukee 9 Wis
Gardner Electric Mfg Co—see Federal Pacific Electric Co
Gardner Products Co 15244 Aubrey Detroit 39 Mich
Gaston Power Tools 999 Ridge Rd Thornton Ill
Gates Electronic Co 2090 Barnes Ave Bronx 62 NY
Gateway Engineering Co 3233 W Grand Ave Chicago 51 Ill
GATEWAYDUCT—Gateway Engineering Co
GEAR-O-MATIC—Franklin Electric Co Inc
GEAREDUCERS—Electra Motors Inc
Gedney Electric Co Americas Bldg Radio City NY 20 NY
GEM—Mallory (PR) & Co Inc
GEM DANDY—Buckels (Chris) Inc
Gem Electric Mfg Co Inc 237 37th St Brooklyn NY
Gemco Electric Co 25685 W Eight Mile Rd Detroit 40 Mich
GEN-PRO—General Products Corp
GENCATHENE—General Cable Corp
GENCATROL—General Cable Corp
General Alliance Corp 2105 Moore St San Diego Calif
General Blower Co 8610 Ferris Ave Morton Grove Ill
General Blower Co—see Ilg Electric Ventilating Co
General Cable Corp 730 Third Ave New York 17 NY
General Cable Corp Clifton Conduit Div—see Clifton Conduit Corp
General Cement Mfg Co—see G-C Electronics Co Div of Textron Electronics Inc
General Control Co 1200 Soldiers Field Rd Boston 34 Mass
General Controls Co 801 Allen Ave Glendale Calif
General Electric Co
Apparatus Sales Div Schenectady 5 NY
Circuit Protective Devices Dept 41 Woodford Ave Plainville Conn
Commercial & Industrial Air Conditioning Dept 5 Lawrence St Bloomfield NJ
Conduit Products Dept 1285 Boston Ave Bridgeport 2 Conn
Distribution Assemblies Dept 41 Woodford Ave Plainville Conn
Home Heating & Cooling Dept Troup Highway Tyler Tex
Laminated Products Dept Coshocton Ohio
Large Lamp Dept Nela Park Cleveland Ohio
Miniature Lamp Dept Nela Park Cleveland Ohio
Room Air Conditioner Dept Appliance Park Louisville 1 Ky
Silicone Products Dept Waterford NY
Technical Products Dept Electronics Park Syracuse NY
Weathertron Dept 5 Lawrence St Bloomfield NJ
Wire & Cable Dept 1285 Boston Ave Bridgeport 2 Conn
Wiring Device Dept 95 Hathaway St Providence RI
General Hardware Mfg Co Inc 80 White St NY 13 NY

General Insulated Wire Works Inc 69 Gordon Ave Providence 5 RI
General Lamps Mfg Corp—see AOW Corp
General Lighting Co 248 McKibbin St Brooklyn 6 NY
General Luminescent Corp—see Pollak Luminescent Corp
General Metals Inc 858 Goldsbro Greensboro NC
General Products Corp 107 Salem St Union Springs NY
General Radio Co West Concord Mass
General Scientific Equipment Co Limekiln Pike & Williams Ave Philadelphia 50 Pa
General Steel Fittings Co 1321 21st St Racine Wis
General Switch Co 45 Roebling St Brooklyn 11 NY
GENERALITER—Duro-Test Corp
GENEMOTOR—Carter Motor Co
GENESCOPE—Simpson Electric Co
GENIE—Alliance Mfg Co Inc
GEON—Goodrich (B F) Chemical Co
Geophysical Instrument Co—see Gerator Corp
Gerator Corp Manassas Va
GEORGE—Clark (George P) Div Cragin & Wilkins Co Inc
Geringer & Sons Mfg Corp Peekskill NY
Gets-A-Lite Co 3865 N Milwaukee Ave Chicago 41 Ill
GIANT—Burgess Battery Co
Gibson Mfg Co 1919 Piedmont Circle N E Atlanta Ga
Gibson Refrigerator Co 515-615 W Williams St Greenville Mich
Girard-Hopkins 1000 40th Ave Oakland 1 Calif
Gisholt Machine Co 1245 E Washington Ave Madison 10 Wis
GISHOLT MASTERLINE—Gisholt Machine Co
Glade Mfg Co 1632 W 75 Pl Chicago 20 Ill
GLAS-VAR—Electro-Technical Products Div
GLASBAKE—McKee Div Thatcher Glass Mfg Co Inc
GLASPUN—Atlas Asbestos Co
GLASSEAL—Pyramid Electric Co
GLASSHEAT—Continental Radiant Glass Heating Corp
GLASSURFACED—Kirlin Co
GLASTERRA—Chase & Sons Inc
Glastic Corp 4321 Glenridge Rd Cleveland 21 Ohio
GLAZON—Triangle Conduit & Cable Co Inc
Gleason (J L) & Co—see Gleason Reel Corp
Gleason Reel Corp 740 N Plankinton Ave Milwaukee 3 Wis
Gleason Sales Co Inc 5809 W Montrose Ave Chicago 34 Ill
Glen Co—see M & T Welding Products Corp
Glen Equipment Co—see M & T Welding Products Corp
Glen Roberts Co—see M & T Welding Products Corp
GLENDALE—King Refrigerator Corp
Glenn Electric Heater Corp 374 Jelif Ave Newark NJ
GLIDE-A-LITE—Globe Lighting Products Inc
GLO GUARD—Hubbard & Co
GLO PLUG—Industrial Devices Inc
GLO-POINT—Vemaline Products Co
GLO-RAY—Curtis Lighting Div Curtis-All Brite
GLO-RITE—Phillips (Oscar) Co
Globar Plant (Refractories Div) Carborundum Co Niagara Falls NY
Globe Lighting Products Inc 1710 Flushing Ave Brooklyn 37 NY
Glo-Lite Instrument Co 428 Peshine Ave Newark 12 NJ
GLOMASTER—Emerson-Pryne Co
GLOW LITE—Spencer Industries
GLOWLITE—Larco Inc
GLYPTAL—General Electric Co
Godfrey Mfg Co 1633 N Halsted St Chicago 16 Ill
Goetz (J F) Mfg Co 162 South St Hartford Wis
GOGETTER—Revolvator Co
GOLD—Kaiser Aluminum & Chemical Sales Inc
GOLD CROWN—Pioneer Gen-E-Motor Co
GOLD MEDAL—Patent Scaffolding Co Inc
GOLD-O-MATIC—Luxor Lighting Products Inc
GOLD SEAL—Jenkins Bros Rubber Div
Goldak Co Inc 1544 W Glenoaks Blvd Glendale 1 Calif
Goldberg & O'Brien Electric Co—see Ther Electric & Machine Works
GOLDEN-D—Cannon Electric Co
GOLDEN SUNBURST—Globe Lighting Products Inc
GOLIATH—David's Gloves Inc
Good-All Electric Mfg Co 112 W First St Ogallala Neb
Good Mfg Co Inc 1015 N Halsted St Chicago 22 Ill
Goodall Rubber Co 493 Whitehead Rd Trenton NJ
Goodrich (BF) Chemical Co 3135 Euclid Ave Cleveland 15 Ohio
Goodrich Electric Co—see Appleton Electric Co
GOPI—Bronze Bearings Inc
Goshen Churn & Ladder Inc Goshen Indiana
Gould-National Batteries Inc Trenton 7 NJ
GOVOHM—Electric Regulator Corp
Graham (Philip E) Co Inc—see Air-Hydraulics of Indiana
Graham Mfg Corp 152 Second Ave Needham Hts 94 Mass
GRAIN-ORIENTED—Vickers Inc
GRAMIX—United States Graphite Co
Gran-Cal Inc—see Calvert Co
GRAPH-A-PLAN—Labelon Tape Co Inc
GRATELITE—Guth (Edwin F) Co
Gray Instrument Co Mill Rd Andalusia Pa
Graybar Electric Co Inc 420 Lexington Ave NY 17 NY
Grayhill Inc 551 Hillgrove Ave La Grange Ill
GREA-NO—Great Northern Mfg Corp
Great Northern Mfg Corp 1056 N Wood St Chicago 22 Ill
Great Western Div—see Interlectric Corp
Green Ball Bearing Co 9518 Cassius Ave Cleveland 5 Ohio
GREEN GUARD—Security Mfg & Contracting Co
Greenlee Tool Co 2136 Twelfth St Rockford Ill
Greibach Instruments Corp Metuchen NJ
GRENADIER—Wakefield Co
Grieve-Hendry Co Inc 1350 N Elston Ave Chicago 22 Ill
Grinnell Co Inc 260 W Exchange St Providence 2 RI
GRIP-FLEX—Copperweld Steel Co Wire & Cable Div
GRIP KLIP—Excel Fuse Co
GRIP-KLIPS—Specialties Inc
Grip-Tite Mfg Co 115 W Jefferson St Winterset Iowa
GRIP-TYPE—Thiel Tool & Engineering Co
GRIPEZE—Phelps Dodge Copper Products Corp
GRIPO—Barrett Varnish Co
GRIPZIN—Star Expansion
GRIZZLY—Kaiser Aluminum & Chemical Sales Inc
GRIZZLY—Pucel Enterprises Inc
GRO-QUICK—Wrap-On Co
GROUND-OHMER—Sticht (Herman H) Co Inc
GROUNDOMETER—Borden Engineering Div M J Johnson Aircraft Engineering Co
GROUNDULET—Crouse-Hinds Co
Gruber Bros Inc 125 South First St Brooklyn 11 NY
Gruber Lighting—see Gruber Bros Inc
GRYPHON—Brook Motor Corp
GUARANTEE—Partrick & Wilkins Co
Guaranteed Products Inc—see Shox-Stok Inc
GUARDIAN—Dura Electric Lamp Co Inc
GUARDIAN—General Cable Corp
Guardian Electric Mfg Co 1621 W Walnut St Chicago 12 Ill
Guardian Light Co 500 N Blvd Oak Park Ill
GUARDSMAN—West Instrument Corp
Guggemos (K) Co—see Kenworth Co
GUIDE-LINED—Republic Steel Corp
GUIDE RAY—Everwarm Inc
GULF STREAM—Signal Electric Div King-Seeley Corp
Gulton Industries Inc Alkaline Battery Div Metuchen NJ
GUSCO—Gustaveson Inc
Gustaveson Inc 8600 Chestnut St Kansas City 32 Mo
Guth (Edwin F) Co 2615 Washington Blvd St Louis 3 Mo
GUTHLITE—Guth (Edwin F) Co
GUY GRIP—Preformed Line Products Co
Guyan Machinery Co Inc Box 150 Logan WVa
Gwilliam Co 348 Furman St Brooklyn 1 NY
GYMLITE—Steber Mfg Co
GYRO-LITE—Swivelier Co Inc

H

H-B Instrument Co American & Bristol Sts Philadelphia 40 Pa
H & H—Arrow-Hart & Hegeman Electric Co
H-P—Hatheway & Patterson Co Inc
Haartz-Mason Inc 270 Pleasant St Watertown 72 Mass
HABIR BUS—Phelps Dodge Copper Products Corp
HABIRDRY—Phelps Dodge Copper Products Corp
HABIRSHAW—Phelps Dodge Copper Products Corp
Hadco Aluminum Products Co P O Box 128 Littlestown Pa
Haertel (Walter) Co 2840 4th Ave So Minneapolis Minn
Haft & Sons Inc 950 Kent Ave Brooklyn 5 NY
HAFTSON—Haft & Sons Inc
HAIRPINLINE—Illuminating Engineering Co
Haley Electronics Co 57 William Street New York 5 New York
Halex Die Casting Co 8640 Bessemer Cleveland 27 Ohio
Haley (R G) & Co Inc 767 Spitzer Bldg Toledo 4 Ohio
Haley (R G) International Corp Inc—see Haley (R G) & Co Inc
HALIDE—Turner Brass Works
HAM-R-TOOL—Fastway Fasteners Inc
Hamilton Caster & Mfg Co 1519 Dixie Highway Hamilton Ohio
Hamilton Fan & Blower Co 2644 Colerain Ave Cincinnati 14 Ohio
HAMMER-HEAD—Perfeclite Co
HAMMER-LOCK—Perfeclite Co
HAMMERKORE—Tilden Tool Mfg Co
HAMMETER—Simpson Electric Co
HAMRFLUTE—Star Expansion
HAMRTWIST—Star Expansion
HAMSWITCH—Mallory (P R) & Co Inc
HANDI-HEET—Smith Welding Equipment Corp
HANDI-UNIT—Bernard-Franklin Co Inc
HANDIE-TALKIE—Motorola Communications & Electronics Inc
HANDY ANGLE—Price & Rutzebeck
Handy Angle Div Lug-All Co 355 Lancaster Ave Haverford Pa
HANDY CRAFT—Westinghouse Electric Corp
HANG-RITE—U S Expansion Bolt Co
Hankscraft Co Control Div—See Acro Switch Div Robertshaw-Fulton Controls Co
HANK'S—Klein (Mathias) & Sons
Hanovia Lamp Div Engelhard Industries Inc 100 Chestnut St Newark 5 NJ
Hansen Mfg Co Inc RR #1 Princeton Ind
HAP-E-LITE—Alkco Mfg Co
HAPCO—Hubbard & Co
HARD-TUNG—Capewell Mfg Co
Harder (Donald C) Co 3710 Midway Dr San Diego 10 Calif
Hardman (H V) Co Inc 571 Cortlandt St Belleville 9 NJ
HARDSET—Hardman (H V) Co Inc
HARDY TOOLS—Interstate Drop Forge Co Special Products Div
Harnischfeger Corp 4400 W National Ave Milwaukee 46 Wis
Harold Electric Co 210 E Alder St Walla Walla Wash
Harper Electric Furnace Corp 39 River St Buffalo 2 NY
Hart & Hegeman—see Arrow-Hart & Hegeman Electric Co
HART-LOCK—Arrow-Hart & Hegeman Electric Co
Hart Mfg Co 164 Bartholomew Ave Hartford Conn
Hartford Blower Co—see Sterling Blower Co
Hartzell Propeller Fan Co S Englert Ave Piqua Ohio
HARTZITE—Hartzell Propeller Fan Co
HARVEL—Minnesota Mining & Mfg Co Irvington Div
HASCO—National Band & Tag Co
Hasco Electric Corp 30 Grove Ave New Rochelle NY
Hastings Air Conditioning Co Inc 108 S Colorado Ave Hastings Neb
HATCORONE—Hatfield Wire and Cable Div Continental Copper & Steel Industries Inc
HATEMP—Hatfield Wire & Cable Div Continental Copper & Steel Industries Inc
HATEX—Hatfield Wire & Cable Div Continental Copper & Steel Industries Inc
Hatfield Wire and Cable Div Continental Copper & Steel Industries Inc 487 Hillside Ave Hillside 5 NJ
HATFLEX—Hatfield Wire & Cable Div Continental Copper & Steel Industries Inc
Hatheway & Patterson Co Inc 156 County St Mansfield Mass
HATROL—Hatfield Wire and Cable Div Continental Copper & Steel Industries Inc
HATSEAL—Hatfield Wire & Cable Div Continental Copper & Steel Industries Inc
HATVINOL—Hatfield Wire & Cable Div Continental Copper & Steel Industries Inc
HAVEN'S—Klein (Mathias) & Sons
Hayden Twist Drill Co Manila Ark
Haydon (A W) Co 232 N Elm St Waterbury Conn
Haydon Div General Time Corp 245 E Elm St Torrington Conn
Hayes (C I) Inc 800 Wellington Ave Cranston 10 RI
HAYMOLITE—Steber Mfg Co
Hays Mfg Co Automatic Controls Div 12th and Liberty Sts Erie 6 Pa
Hazard Insulated Wire Works—see Okonite Co
HAZARDCHECK—Westline Products Div Western Lithograph Co
HAZARDSTRIPE—Westline Products Div Western Lithograph Co
HEADERDUCT—Walker Brothers
Healy-Ruff Co Water Level Controls Div 2255 University Ave St Paul 14 Minn
HEAT-A-LITE—Nutone Inc
HEAT KILLERS—Coppus Engineering Corp
Heat-Timer Corp 657 Broadway New York 12 NY
HEATAIRE—Markel Electric Products Inc
HEATMOBILE—Siebring Mfg Co
Heatmore Inc 651 Driggs Ave Brooklyn 11 NY
HEATSUM—Roberson Inc
Heatube Corp—see Heatube Dept
Heatube Dept Coolerator Div McGraw-Edison Co Albion Mich
HEET-X—Hatfield Wire & Cable Div Continental Copper & Steel Industries Inc
Hein-Werner Corp 1200 National Ave Waukesha Wis
Heinemann Electric Co Pennsylvania Ave & Plum St Trenton 2 NJ
Heinze Electric Co 685 Lawrence St Lowell Mass
HELECON—United States Radium Corp
Heller Co—see Heller Industrial Fastener Div Heller Roberts Mfg Corp
Heller Bros Co—see Heller Tool Co
Heller Industrial Fastener Div Heller Roberts Mfg Corp 6115 Carnegie Ave Cleveland 1 Ohio
Heller Tool Co Heller Drive Newcomerstown Ohio
Helwig Co—see Helwig Carbon Products Inc
Helwig Carbon Products Inc 2550 N 30 St Milwaukee 10 Wis
Helwig Mfg Co—see Interstate Drop Forge Co
HEMINGRAY—Kimble Glass Co
Henderson Electric Co 25 Greenwood Ave East Orange NJ
Henderson-Hazel Corp 13601 Euclid Ave Cleveland 12 Ohio
Hendrix Wire & Cable Corp Milford NH
HERCULES—Linemaster Switch Corp
HERCULES—Whitman & Barnes Div United Drill & Tool Corp
HERCULON—Dossert Mfg Corp
Hertner Electric Co 12690 Elmwood Ave Cleveland 11 Ohio
HESS BRIGHT—SKF Industries Inc
Hesse (W A) & Co—see Hesse Products Co
Hesse Products Co 3800 N Virginia St Reno Nev
Hessel (W F) Co Inc 74 Beekman St NY 38 NY
Hevi Duty Electric Co P O Box 563 Milwaukee 1 Wis
Hewitt-Robbins Inc 666 Glenbrook Rd Stamford Conn
Hewson (John) Co—see Hewson Co Inc
Hewson Co Inc 115 Maple St Summit NJ
HEX-A-LUME—Solux Corp
Hexacon Electric Co 161 W Clay Ave Roselle Park NJ
HEXCAST—U S Expansion Bolt Co
Hexcel Products Inc 2332 4th St Berkeley 10 Calif
HEXCLAD—Hexacon Electric Co
HEXSEAL—Automatic & Precision Mfg Co

HEXTHODE—Luxor Lighting Products Inc
HEYCO—Heyman Mfg Co
Heyman Mfg Co Kenilworth 20 NJ
HI—Holub Industries Inc
HI-AMP—Lenco Inc
HI-CAP—Bussmann Mfg Div McGraw-Edison Co
HI-CORE—Alpha Metals Inc
HI-EF—Kent Lighting Corp
HI-FLO—General Controls Co
HI-FLOOD—Radiant Lamp Corp
HI-FLUX—Annis (R B) Co
HI-HAT—Litecraft Mfg Corp
HI-HEAT—Radiant Lamp Corp
HI-HOIST—Lantz Mfg Co Inc
HI-LAC—Ware Fuse Corp
HI LO—Industrial Devices Inc
HI-LO—Metalcraft Products Co Inc
HI-LO—Slater Electric & Mfg Co Inc
HI-LOAD—Waco-Porter Corporation
HI-LO-FLEX—AOW Corp
HI-MEG—Dolph (John C) Co
HI-RANGER—Mobile Aerial Towers Inc
HI-REACH—Economy Engineering Co
Hi-Scale Products Corp 132 West 22nd Street New York 11 New York
HI-SPEED—Dockson Corp
HI-SPOT—Radiant Lamp Corp
HI-STRENGTH—Blackburn (Jasper) Corp
HI-SUPERITE—Engelhard (Charles) Inc
HI-THERM—Dolph (John C) Co
HI-TORK—Electro-Mechanical Instrument Co
HI-TREADLITE—Linemaster Switch Corp
HI-TRONIC—Bliss Electronic Corp
HI-VOLT—Industrial Devices Inc
HIBOY—Holophane Co Inc
Hickok Electrical Instrument Co 10514 Dupont Ave Cleveland 8 Ohio
HICYCLE—Chicago Pneumatic Tool Co
Hiergesell Bros—see H-B Instrument Co
HIGH BAY—Curtis Lighting Div
HIGH SPEED—Capewell Mfg Co
Highway Trailer Co 405 E Fulton St Edgerton Wis
Hill (Walter P) Inc 22183 Telegraph Rd Detroit 19 Mich
Hillsdale Commutator Co—see Toledo Commutator Co
HILO—Driver (Wilbur B) Co
Hilti Rapid Fastening Systems Inc 73 Southfield Ave Stamford Conn
Hindle Transformer Co Inc Woods Church Rd Flemington NJ
HINJON—Thomas & Betts Co
HIPOT—Peschel Electronics Inc
HIPPO—Mueller Electric Co
Hirschman-Pohle Co Inc 300 Lent Ave Le Roy NY
Hitemp Wires Inc 1200 Shames Dr Westbury NY
HIWRAP—Hitemp Wires Inc
HO—Phelps Dodge Copper Products Corp
Hobart Bros Hobart Square Troy 1 Ohio
Hoffman Engineering Corp 1050 Tyler St Anoka Minn
HOIST-ALL—Coffng Hoist Div Duff-Norton Co
HOL-DEM—Electric Service Systems Inc
Holan Corp 4100 W 150 St Cleveland 35 Ohio
Holan (J H) Corp—see Holan Corp
Holcor Metal Fabricating & Finishing Corp—see House-O-Lite Corp
Hold-Dem Electric Fencer Co—see Electric Service Systems Inc
HOLD-IT—Arro Expansion Bolt Co
HOLD-IT—Madison Equipment Co
HOLD-TITE—Titchener (E H) & Co
HOLDA-LITE—Hoffman Engineering Corp
HOLDFAST—Ludlow Mfg & Sales Co
HOLDTITE—United States Rubber Co
HOLE-SHOOTER—Milwaukee Electric Tool Corp
HOLGUN—Black & Decker Mfg Co
HOLIDAY—Day-Brite Lighting Inc
Hollands Mfg Co—see Erie Tool Works
Hollingsworth (John R)—see Hollingsworth Co
Hollingsworth Co Solderless Terminal Div Box 430 Phoenixville Pa
HOLLOSHAFT—U S Electrical Motors Inc
HOLOFLUX—Holophane Co Inc
Holophane Co Inc 342 Madison Ave New York 17 NY
Holtzer-Cabot Div National Pneumatic Co Inc 125 Amory St Boston 19 Mass
Holtzer-Cabot Electric Co—see Holtzer-Cabot Div National Pneumatic Co Inc
Holub Industries Inc 442 Elm St Sycamore Ill
HOLZIN—Star Expansion
HOM-A-LARM—Castle Engineering Co
Homelite Corp—see Homelite Div Textron Inc
Homelite Div Textron Inc 67 Riverdale Ave Port Chester NY
Homer Commutator—see Toledo Commutator Co
HOMOCORD—Raybestos-Manhattan Inc
HOMOFLEX—Raybestos-Manhattan Inc
HONEYLITE—Hexcel Products Inc
Hoover Co—see Kingston Conley Inc
Hopax Electric Inc 547 Greenwich St NY 13 NY
Hope Electrical Products Co Inc 27 Long Ave Hillside NJ
HORIZON—Benjamin Div (Thomas Industries Inc)
HORSE HEAD—New Jersey Zinc Co
Hose-McCann Corp—see Hose-McCann Telephone Co Inc
Hose-McCann Telephone Co Inc 25th St & 3rd Ave Brooklyn 32 NY
HOSPITAL-LITE—Swivelier Co Inc
HOSPITALITY LIGHT—Versen (Kurt) Co
Hossfeld Mfg Co 460 W Third St Winona Minn
HOT ROD—Pyrosil Inc
HOTKOTE—Mark (Clayton) & Co
HOTPACK—Electric Hotpack Co Inc
Hotpoint Co 5600 W Taylor St Chicago 44 Ill
HOTTAP—Burndy Corp
House-O-Lite Corp 2430 S Ashland Ave Chicago 8 Ill
HOW-ELL-DOR—Howell Mfg Co
Howard Electric Co 1950 Ruby St Melrose Park Ill
Howard Industries Inc 1760 State St Racine Wis
HOWARDUCT—Howard Electric Co
Howell Electric Motors Co 409 N Roosevelt Howell Mich
Howell Mfg Co 21 N Morehall Rd Paoli Pa
HOWE'S—Klein (Mathias) & Sons
Hoyt Electrical Instrument Works 42 Carleton St Cambridge 42 Mass
Hoyt Mfg Corp Forge Rd Westport Mass
Hub Electric Co 2255 W Grand Ave Chicago 12 Ill
HUB MOUNT—Hubbard & Co
Hubbard & Co 6301 Butler St Pittsburgh 1 Pa
Hubbard Spool Co—see American Pulley Co
Hubbell (Harvey) Inc State St & Bostwick Ave Bridgeport 2 Conn
HUBBELLOCK—Hubbell (Harvey) Inc
HUBEYE—Hubbard & Co
HUBRAK—Hubbard & Co
Hudson Lamp Co 528 Elm St Kearny NJ
Huenefeld Co Engineered Products Div 2701 Spring Grove Ave Cincinnati 25 Ohio
Hughes Bros Inc Seward Neb
Hughey & Phillips Inc 3200 North San Fernando Blvd Burbank Calif
Hulhorst Micro Tool Co—see Hulhorst Tools Inc
Hulhorst Tools Inc 227 Wamba Ave (P O Box 344) Toledo 7 Ohio
HUMID-I-METER—Walton Laboratories Inc
HUMIDOLAN—Star Porcelain Co
HUMIDOMIST—Supreme Electric Products Co
HUMP DRIVE—Thiel Tool & Engineering Co
Hunter (H D) & Co—see Hunter Tools
Hunter Div Robbins & Myers Inc 2500 Frisco Ave Memphis 14 Tenn
Hunter Fan & Ventilaitng Co—see Hunter Div Robbins & Myers Inc
Hunter (R N) Sales Co—see Hunter Tools
Hunter Tools 9851 Alburtis St Santa Fe Springs Calif
HUNTSMAN—Kedman Co
Huntsman Welding Shield Co—see Kedman Co
Huppert (K H) Co 6830 S Cottage Grove Ave Chicago 37 Ill
HUSKY—Price Electric Corp
Husky Products Inc 5300 Vine St Cincinnati 17 Ohio
Hussey (CG) & Co 2850 Second Ave Pittsburgh 19 Pa
HY-A-SIL—Miller (Sanford) Co
HY-CAP—Illinois Condenser Co
HY-LECTRIC—Kritzer Products Div
HY-LITE—American Concrete Corp
HY-LITER—Guth (Edwin F) Co
HY-LOAD—Hyatt Bearings Div General Motors Corp
HY-RE-FLEC—Globe Lighting Products Inc
HY-SOL—Charleston Rubber Co
HY-TIN—Farrelloy Co
HY-V—DeBothezat Fans Div
Hyatt Bearings Div General Motors Corp Harrison NJ
HYCASTE—Premax Products Div
HYDENT—Burndy Corp
HYDRA-LIFT—Pitman Mfg Co
HYDRAGRIP—Armstrong-Bray & Co
HYDRAKOTE—Hatfield Wire & Cable Div
HYDRALLOY—Okun (A L) Co Inc
HYDRANOID—General Control Co
HYDRATEMP—Hatfield Wire & Cable Div
HYDRATUBE—Recora Co Inc
HYDROELECTRIC—Lift Trucks Inc
HYDROSEC—Kaiser Aluminum & Chemical Sales Inc
HYDROSPERSE—Fidelity Chemical Products Corp
HYDUTY—Davidson Fan Co
HYGRADE—Markel (L Frank) & Sons
Hykon Mfg Co 163 E State St (P O Box 923 EP) Alliance Ohio
HYLINK—Burndy Corp
HYLUG—Burndy Corp
HYPER-PURITY GOLD—American Silver Co
HYPERCORE—Moloney Electric Co
HYPERSIL—Westinghouse Electric Corp
HYPOT—Associated Research Inc
HYPRESS—Burndy Corp
HYPRO—Hypro Engineering Inc
Hypro Engineering Inc 700 39th Ave N E Minneapolis 21 Minn
HYPRO SMALL TWIN—Hypro Engineering Inc
HYRAMOTOR—General Controls Co
HYSPLICE—Burndy Corp
Hyster Co 2902 N E Clackamas St Portland 8 Ore
HYTAP—Burndy Corp
HYTOOL—Burndy Corp
HYTORK—Allis-Chalmers Mfg Co
HYVOLT—Crescent Insulated Wire & Cable Co

I

I-EZE—Artistic Lamp Mfg Co Inc
I-LINE—Allen Cooler & Ventilator Inc
I A C—Industrial Automation Corp
IBM—International Business Machines Corp
IDI—International Devices Inc
IEFCO—International Electric Fence Co Inc
IEP—Illinois Edison Porcelain
IMC—Insulation Mfrs Corp
IMC Magnetics Corp 570 Main St Westbury NY
IMP—Pyramid Electric Co
IMP—Superior Insulating Tape Co
IPC—Independent Protection Co Inc
IPF—Industrial Plastic Fabricators Inc
I-T-E Circuit Breaker Co 1900 Hamilton St Philadelphia 30 Pa
I-T-E Circuit Breaker Co Greensburg Div P O Box 98 Greensburg Pa
I-T-E Circuit Breaker Co Victor Insulators Div Victor NY
ITT Components Div P O Box 412 Clifton NJ
IXL—Collyer Insulated Wire Co
IDEAL—Royal Electric Co
Ideal Commutator Dresser Co—see Ideal Industries Inc
Iceal Electric and Mfg Co East First St Mansfield Ohio
Ideal Industries Inc 5136 Park Ave Sycamore Ill
IDEALARC—Lincoln Electric Co
Ilg Electric Ventilating Co 2850 N Pulaski Rd Chicago 41 Ill
ILGETTE—Ilg Electric Ventilating Co
ILGUENT—Ilg Electric Ventilating Co
ILGWINDOWAIRE—Ilg Electric Ventilating Co
ILLINI-HY-CAP—Illinois Condenser Co
Illinois Condenser Co 1616 N Throop St Chicago 22 Ill
Illinois Edison Porcelain McGraw-Edison Co 510 N Pearl St Macomb Ill
Illinois Electric Porcelain Co—see Illinois Edison Porcelain
Illinois Malleable Iron Co—see Appleton Electric Co
Illinois Testing Laboratories Inc 420 N LaSalle St Chicago 10 Ill
Illuminating Engineering Co 2347 East Nine Mile Rd Hazel Park Mich
Illumitronic Engineering 680 East Taylor Ave Sunnyvale Calif
Ilsco Corp 4730 Madison Rd Cincinnati 27 Ohio
Ilsco Copper Tube & Products Inc—see Ilsco Corp
IMCOR—Insulation Mfrs Corp
IMMERSATHERM—Mercoid Corp
IMPACTOOL—Ingersoll-Rand Co
IMPERIAL—Miller Co
Imperial Electric Co 84 Ira Ave Akron 9 Ohio
Imperial Lighting Products Co—see Emerson Imperial Lighting Co
IMPERIOLITE—Emerson-Imperial Lighting Co
IMPERVEX—Crescent Insulated Wire & Cable Co
IMPERVOIL—Crescent Insulated Wire & Cable Co
IMPROV-A-LITE—General Electric Co
IN-BILT—Holophane Co Inc
IN-BUILT—Nutone Inc
IN-LINE—Link-Belt Co
INCA—Phelps Dodge Copper Products Corp
INCA-LIGHTS—Wilson (J A) Lighting & Display Inc
INCELOID—American Products Mfg Co Inc
INCH-MARKED—Republic Steel Corp
INDEECO—Industrial Engineering & Equipment Co Inc
Independent Pneumatic Tool Co—see Thor Power Tool Co
Independent Products Co—see Independent Protection Co Inc
Independent Protection Co Inc 1605-07 S Main St Goshen Ind
Induction Heating Corp 181 Wythe Ave Brooklyn 11 NY
Induction Motors Corp—See IMC Magnetics Corp
INDUCTROL—General Electric Co
INDUCTUNER—Mallory (P R) & Co Inc
Industrial Automation Corp 2415 W Montrose Ave Chicago Ill
Industrial Control Panel Co—see Control Panel Corp
Industrial Development Labs Inc 982 River Rd Edgewater NJ
Industrial Devices Inc Edgewater 19 NJ
Industrial Electric & Mfg Co—see Heatube Dept
Industrial Electrical Works Inc 1509 Chicago St Omaha 2 Neb
Industrial Engineering & Equipment Co Inc 24 Hanley Industrial Ct St Louis 17 Mo
Industrial Engravers Inc 2212 McDonald Ave Brooklyn 23 NY
Industrial Instrument Co—see Seely Instrument Co Inc
Industrial Instruments Inc 89 Commerce Rd Cedar Grove NJ
Industrial Lamp Corp 14th & Blaine Sts Elkhart Ind
Industrial Plastic Fabricators Inc Endicott St Norwood Mass
Industrial Plastic Fittings Co 3891 W 150 St Cleveland 11 Ohio
Industrial Transformer Corp Gouldsboro Pa
INDUSTRIALIST—Duro-Test Corp
Industriline Inc—see Cam-Lok Div Empire Products Inc
INTERTEEN—Westinghouse Electric Corp
INFINI-LITE—Integrated Ceilings Inc
INFRA-FLOW—Electro-Products Mfg Co
INFRAFLO—Electro-Ray Mfg Co
Ingersoll-Rand Co 11 Broadway NY 4 NY
INHIBISOL—Penetone Co
INKIE—Condi-Lite Corp
Inland Ladder Co 1914 Stanford St Alameda Calif
INMANCO—Insulation Mfrs Corp
INNER-SPRINGS—Urell Inc
INSA-LUTE—Sauereisen Cements Co
INSANOL—Westinghouse Electric Co
INSECTO—Solar Electric Corp
INSOLUSEAL—Anaconda Wire & Cable Co
INST-O-VERSE—Franklin Electric Co Inc
INSTA-START—France Mfg Co
INSTANT CALL—Radio Corp of America
INSTANT HEAT—Emerson-Pryne Co

INSTANT HEAT—Wall (P) Mfg Co
Insto-Gas Corp 998 E Woodbridge St Detroit 7 Mich
INSTROF—Cope (TJ) Div Rome Cable Corp
Instrument Laboratories 315 W Walton Pl Chicago 10 Ill
Insul-8-Corp 1369 Industrial Rd San Carlos Calif
INSUL-LOCK—Anthony (F M) Co
INSUL-PIN—Graham Mfg Co
INSULAG—Quigley Co Inc
Insulation Mfrs Corp 565 W Washington Blvd Chicago 6 Ill
INSULINER—Thomas & Betts Co
INSULINK—Burndy Corp
INSULPRENE—Hubbell (Harvey) Inc
INSULUG—Burndy Corp
INSULSEAL—Eagle-Picher Co
INTAIRE—Westinghouse Electric Corp
Integrated Ceilings Inc 11766 W Pico Blvd Los Angeles 64 Calif
INTENSO—Appleton Electric Co
INTER-LINK—Cable Electric Products Inc
INTER-LINK—Leviton Mfg Co Inc
INTERFERENCE FREE—Cold Cathode Lighting Corp
Interlectric Corp 1401 Lexington Ave Warren Pa
INTERLOCK—Hubbell (Harvey) Inc
INTERMATIC—International Register Co
International Business Machines Corp Times Equipmet Div 590 Madison Ave New York 22 NY
International Crossarm Co Inc—see Haley (R G) & Co Inc
International Electric Fence Co Inc Box 650 Albert Lea Minn
International Electric Industries Inc—see Beckley Electric Co Inc
International Fermont Machinery Co Inc Ramapo NY
International Lighting Mfg Co 1825 N 19 St St Louis 6 Mo
International Metal Hose Co Ashford Ave Bellevue Ohio
International Oil Burner Co 3800 Park Ave St Louis 10 Mo
International Paper Co Wood Preserving Div Kansas City 6 Mo
International Register Co 2620 W Washington Blvd Chicago 12 Ill
International Seal & Knot Protector Co 58-02 37th Ave Woodside 77 NY
International Telephone & Telegraph Corp Industrial Products Div 15191 Bledsoe St San Ferando Calif
International Trailer Co Inc 725 North Point Rd Baltimore 6 Md
Interstate Drop Forge Co Special Products Div 4051 N 27 St Milwaukee 16 Wis
Interstate Rubber Products Corp 908 Avila St Los Angeles 12 Calif
INTRA-TEL—General Electric Co
INVERTOLITE—Adjustable Fixture Co
Invincible Vacuum Cleaner Mfg Co Dover Ohio
INVISIBLE-RAY—American District Telegraph Co
Iona Ventilater Co Inc 2821-29 W Dauphin St Phila 32 Pa
IONAIRE—Wesix Electric Heater Co
IONOSTAT—United States Radium Corp
IONOTRON—United States Radium Corp
Iron Fireman Electronics Div—see Signet Controls
IRON MIKE—Arco Mfg Co
IRONCLAD—Exide Industrial Div
IRRATHENE—General Electric Co
Irvington Varnish & Insulator Co—see Minnesota Mining & Mfg Co Irvington Div
Irwin Auger Bit Co 92 Grant St Wilmington Ohio
Isert (John H) Co—see Queen Products Co Inc
ISO—Isolantite Mfg Corp
ISO GLAS—Natvar Corp
ISOBESTOS—Natvar Corp
ISOFORCE—General Control Co
Isolantite Mfg Corp Stirling NJ
ISOLASTANE—Natvar Corp
ISOLITE—United States Radium Corp
IVANHOE—Miller Co
IVCO—Iona Ventilator Co Inc
IVORY-X—Pass & Seymour Inc

J

J-LINE—Lint (Clyde W)
Jack & Heintz Inc 17600 Broadway Cleveland 1 Ohio
JACK RABBIT—Hubbell (Harvey) Inc
JACK STACKER—Lewis-Shepard Products Inc
JACKLIFT—Lewis-Shepard Products Inc
JACKSON—Vulcan Electric Co
Jackson Electrical Co 900 W Van Buren St Chicago 7 Ill
Jackson Electrical Instrument Co 124 McDonough St Dayton 2 Ohio
JAGABI—Biddle (James G) Co
Janette Electric Mfg Co LeHigh at Main Sts Morton Grove Ill
JAQUET—Sticht (Herman H) Co Inc
Javex P O Box 646 Redlands Calif
Jay Lighting Mfg Co Inc 23-29 Quincy St Brooklyn 38 NY
JAYCANDESCENT—Jay Lighting Mfg Co Inc
JEEP—Mercury Mfg Co
Jefferson Electric Co 25th & Madison Bellwood Ill
Jeffrey Mfg Co 832 N 4 St Columbus 16 Ohio
Jeffries Transformer Co 610 Turner St Los Angeles 12 Calif
Jenkins Bros Rubber Div 100 Park Ave NY 17 NY
Jensen Inc 9331 Freeland Ave Detroit 28 Mich
Jensen Specialities Inc—see Jensen Inc
Jerrold Electronics Corp 23rd & Chestnut Sts Phila 3 Pa
JET FLUX—All-State Welding Alloys Co Inc
Jet Line Gun Co 730 Seigle Ave Charlotte NC
JET-STREAM—Signal Electric Div King-Seeley Corp
Jeta Inc Yonkers NY
Jeta Metal Fabricators Inc—see Jeta Inc
JETALECTRIC—Jeta Inc
JETAPOWER—Jeta Inc
JETSTREAM—Kent Co
JEWEL—Dependable-Electric Mfg Co Inc
JIFFY—Eagle Electric Mfg Co Inc
JIFFY—Lint (Clyde W)
JIFFY—Minerallic Electric Co
Jo-Bell Products Inc 5456 W 111 St Oak Lawn Ill
JOB-SITE—International Trailer Co Inc
JOBMASTER—Ramset Fastening System
Johns-Manville 22 E 40 St New York 16 NY
Johnson Bronze Co 490 S Mill St New Castle Pa
Johnson Mfg Co Inc 600 Anamosa Rd Mt Vernon Iowa
Johnston Foil Mfg Co 6106 S Broadway St Louis 11 Mo
JOINTED-ARM—Woodward Machine Co
JOMANCO—Johns-Manville
Jones Motrola Corp 432 Fairfield Ave Stanford Conn
Jordan Co 51st & Merrimac Ave Chicago 38 Ill
Jordan Electric Products Div Electric Storage Battery Co 222-228 N 2nd St Minneapolis 1 Minn
Jordan Electrical Mfg Co—see Jordan Electric Products
Jordan Electronic Mfg Co Inc—see Jordan Electronics
Jordan Electronics 3025 W Mission Rd Alhambra
Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 Ill
Joy Mfg Co H W Oliver Bldg Pittsburgh 22 Pa
Joy Mfg Co Electrical Products Div 1201 Macklind Ave St Louis 10 Mo
JUMBO PLATE—Sierra Electric Corp
JUMBODUCT—National Electric Div H K Porter Co
JUTE PLUG—Arro Expansion Bolt Co

K

K-B Lighting Mfg Co 2101 Byberry Rd Phila 16 Pa
K & B—Kirk & Blum Mfg Co
K & H—Krueger & Hudepohl Inc
K-LITE—Kalsan Electric Co Inc
K & M—Keasbey & Mattison Co
K-R—Kruse-Rieke
K-RAY-XH—Condi-Lite Corp
K-S-V—Arex Co
KVT—Neo-Ray Products Inc
K/W—Kaiser Aluminum & Chemical Sales Inc
KA-LUG—Burndy Corp
Kaiser Aluminum & Chemical Sales Inc Kaiser Center 300 Lake Side Drive Oakland 12 Calif
Kalamazoo Tank & Silo Co 508 Harrison St Kalamazoo Mich
Kalb Fell Laboratories Inc—see Kin Tel
Kalson Electric Co Inc 146 Mott St Oceanside NY
KANTARK—Trico Fuse Mfg Co
KARAK—Ohio Carbon Co
KARBATE—National Carbon Co
KARRI-GO—Silent Hoist & Crane Co
KATHANODE—Gould-National Batteries Inc
Kato Engineering Co 1442 First Ave Mankato Minn
Katolight Corp First Ave at Chestnut (P O Box 891) Mankato Minn
Kauffman Air Conditioning Co 4336 W Pine Blvd St Louis Mo
Kawneer Co Niles Mich
KAY-BEE—K-B Lighting Mfg Co
Kay Electric Co Maple Ave Pine Brook NJ
KAY LAB—see Kin Tel
Kayline Co 2480 E 22 St Cleveland 15 Ohio
KAYMOR—Scranton Storage Battery Corp
KEARNALEX—Kearney (James R) Corp
Kearney (James R) Corp 4236 Clayton Ave St Louis 10 Mo
Keasbey & Mattison Co Butler Ave Ambler Pa
KECO—Kuhlman Electric Co
Kedman Co 233 S Fifth West St Salt Lake City Utah
KEELITE—McKee Div
KEEN-ARC—Becker Bros Carbon Co
KEEN-CUT—Becker Bros Carbon Co
Kees (F D) Mfg Co 700 Park Ave Beatrice Neb
Keil (Francis) & Sons Inc—see Trine Mfg Corp
KELCO—Kneisley Electric Co
Kellems Co Inc 15 Williams St Stonington Conn
Kellems Products Co—see Kellems Co Inc
Kelly Specialty Co 5958-60 Washington Blvd Chicago 44 Ill
KEN-AIRE—Argo Products Co
Kenbert-Arpag Co 220 Coster St Bronx 59 NY
Kendall Co—see Polyken Sales Div
Kennecott Wire and Cable Co Phillipsdale (Rumford 16) RI
Kent Co Inc 359 Canal St Rome NY
Kent Lighting Corp 500 Johnson Ave Brooklyn 37 NY
Kent Metal Mfg Co Inc—see Kent Lighting Corp
KENTLITE—Kent Lighting Corp
Kerrigan Iron Works Co 1033 Herman St Nashville 2 Tenn
Kester Solder Co 4201 Wrightwood Ave Chicago 39 Illinois
Kett Appliance Co—see Kett Tool Co
Kett Tool Co 5055 Madison Rd Cincinnati 27 Ohio
Key-Hak Corp—see Producers & Distributors Inc
Key-Hak Products Co—see Producers & Distributors Inc
Keyes-Davis Co 74 14th St Battle Creek Mich
KEYNOTE—Edwards Co Inc
KEYSTONE—Diamond Expansion Bolt Co Inc
KEYSTONE—Fullman Mfg Co
Keystone Carbon Co Inc 1935 State St St Marys Pa
Keystone Electric Mfg Co 2228 E Tioga St Phila 34 Pa
Keystone Mfg Co 23328 Sherwood Rd Warren Mich
Kichler (L D) Co 2101 Superior Ave Cleveland 14 Ohio
Kidde (Walter) & Co Inc 459 Main St Belleville 9 NJ
Kidde Ultrasonics & Detection Alarms Inc 459 Brighton Rd Clifton NJ
Kilbury Mfg Co Inc 14529 Hawthorne Blvd Lawndale Calif
Killark Electric Mfg Co 3940 Easton Ave St Louis 13 Mo
Killark Electric Mfg Co 3940 Easton Ave St Louis 13 Mo
KILOTRON—Electric Arc Inc
Kimble Glass Co P O Box 1035 Toledo 1 Ohio
Kin Tel 5725 Kearney Villa Rd San Diego 12 Calif
KINAMATIC—General Electric Co Apparatus Sales Div
KINATROL—General Electric Co Apparatus Sales Div
Kindorf Co—see Steel City Electric Co
KING—Partrick & Wilkins Co
King Mfg Corp 3146 N Chicago Ave Chicago 22 Ill
King Refrigerator Corp 76-02 Woodhaven Blvd Glendale 27 NY
Kingston Conley Inc North Plainfield NJ
Kingston Conley Electric Co—see Kingston Conley Inc
Kinney Electrical Mfg Co 678 Buckeye St Elgin Ill
Kirei Inc CPO Box 387 Kingston NY
Kirk & Blum Mfg Co 3120 Forrer St Cincinnati 9 Ohio
KIRK-KEY—I-T-E Circuit Breaker Co
Kirkland (H R) Co 8 King St Morristown NJ
Kirkwood Carbon Corp 4857 W 130 St Cleveland 35 Ohio
Kirkwood Commutator Corp 4855 W 130 St Cleveland 35 Ohio
Kirlin Co 3435 E Jefferson Ave Detroit 7 Mich
Kisco Co Inc 2414 De Kalb St St Louis 4 Mo
KITCHEN-AIRE—Stewart Industries Inc
KLAMPSWITCH FUZ—Adam (Frank) Electric Co
KLEARCOR—Western Plastics Corp
KLEEN-SEEL—Anderson Electric Corp
Klein (Leo) Electronics 2404 S LaBrea Ave Los Angeles 16 Calif
KLEIN-KORD—Klein (Mathias) & Sons
KLEIN-LINE—Klein (Mathias) & Sons
KLEIN-LOK—Klein (Mathias) & Sons
Klein (Mathias) & Sons 7200 McCormick Rd Chicago 45 Ill
Kliegl Bros Universal Electric Stage Lighting Co Inc 321 W 50 St NY 19 NY
KLIEGLIGHT—Kliegl Bros
KLIEGTRONIC—Kliegl Bros
Kliglite Mfg Co 316 Delancey St Phila 6 Pennsylvania
KLIKSWITCH—General Control Co
Kline Savidge Co Inc 163 N Third St Phila 6 Pa
KLIP-BEAM—Cable Electric Products Inc
KLIP-BILT—Frick-Gallagher Mfg Co
KLIPLOK—Trico Fuse Mfg Co
KLIPTITE—Kulka Electric Corp
KLIXON—Metals & Controls Div
KLONDIKE—Perfeclite Co
KLOZ-A-LITE—Slater Electric & Mfg Co Inc
Knapp-Monarch Co Bent & Potomac St Louis 16 Mo
Kneisley Electric Co 2501-2509 Lagrange St Toledo 3 Ohio
KNI-TRON—Kneisley Electric Co
Knopp Inc 1307 66th St Oakland 8 Calif
Knox Porcelain Corp 2706 Mynders Ave (P O Box 2031) Knoxville 1 Tenn
Koch (Paul W) & Co—see Lint (Clyde W)
Koch & Lowy Inc 201 E 34 St New York 16 NY
KODAIRE—Sperti Faraday Inc
Koehler Mfg Co 395 Lincoln St Marlboro Mass
Kohler Co Kohler Wis
Koiled Kords Inc Box K Hamden Conn
KOLDBOND—Columbia Electric & Mfg Co
KOLOR KODED—Guth (Edwin F) Co
Kolton Electric Mfg Co 123 New Jersey Railroad Ave Newark 5 NJ
Kondu Corp 1040 W 12 St Erie Pa
KONKRETE KORE—Tilden Tool Mfg Co
KOOL-SEL—Pyramid Electric Co
KOOLER-AIRE—United States Air Conditioning Corp
KOOLPAK—Sprague Electric Co
Kopex Div Gemmer Mfg Co 6400 Mt Elliott Ave Detroit Mich
Koppers Co Inc Wood Preserving Div 750 Koppers Bldg Pittsburgh 19 Pa
Kord (Leonard E) Co P O Box 55424 Indianapolis 5 Ind
Kord Mfg Co Inc 4510 White Plains Rd New York 70 NY
KORDUCT—Johns-Manville
KORKER—U S Expansion Bolt Co

KORNER KING—RCS Tool Corp
Korns (C C) Co P O Box 483 Johnstown Pa
KOTACOIL—Induction Heating Corp
KOTE-LITE—Woodward Machine Co
Kraeuter & Co Inc 585 18th Ave Newark 3 NJ
KRALASTIC—United States Rubber Co
KRANE KAR—Silent Hoist & Crane Co
Kritzer Products Div Peerless of America 5800 N Pulaski Rd Chicago 46 Ill
KROMOVER—All-State Welding Alloys Co Inc
Kruse-Rieke Auburn Ind
Krueger & Hudepohl Inc 1041 Evans St Cincinnati 4 Ohio
Kuhlman Electric Co P O Box 288 Birmingham Mich
Kulka Electric Corp 633 S Fulton Ave Mount Vernon NY
Kurman Electric Co 191-193 Newel St Brooklyn 22 NY
KURMELEC—Kurman Electric Co
Kurtzon (Morris) Inc 1420 S Talman Ave Chicago 8 Ill
Kurz & Root Co Inc—see Kurz & Root Sales & Engineering Corp
Kurz & Root Sales & Engineering Corp 232 East North Island St Appleton Wis
KWIK—Dunton (MW) Co
KWIK BAR—Kruse-Rieke
KWIKCHANGE—Leviton Mfg Co Inc
KWIK-KALL—Loge (J M) Sound Engineers
KWIK-THERM—Cannon Ele Co
Kwikheat Mfg Co 3732 Fernando Rd Glendale 4 Calif
KWIXTURE—Project Fixture Mfg Corp
KYLON—Mystik Adhesive Products Inc
Kyova Fibre Pipe Co Ironton Ohio

L

LAM Inc 414 Main St Wakefield Mass
LAM Worshop Inc—see Lam Inc
L-M—Line Material Industries
L & P—Light & Power Utilities Corp
L P I—Lighting Products Inc
L-R Mfg Co—see Ripley Co Inc
LS-FLOOD—Radiant Lamp Corp
LAB-HEAT—Blue M Electric Co
Labelon Tape Co Inc 450 Atlantic Ave Rochester 9 NY
LABSTROBE—Berkshire Laboratories
LACKON—United States Radium Corp
Laclede Steel Co Arcade Bldg St Louis 1 Mo
Laduby Co Inc Boston Post Rd (P O Box 88) Branford Conn
LAG SHIELDS—Rawlplug Co Inc
Laganke Electric Co—see Lake Shore Electric Corp
LAKE—National Time & Signal Corp
Lake Erie Electric Mfg Inc 2952 W 22 St Erie Pa
Lake Mfg Co 2323 Chestnut St Oakland Calif
Lake Shore Electric Inc—see Lake Shore Electric Corp
Lake Shore Electric Corp 205 Willis St Bedford Ohio
Lake Shore Electric Mfg Co—see Lake Shore Electric Corp
LAKIN—Thomas & Betts Co
Laminated Plastics Inc—see Glastic Corp
LAMP SNATCHER—Rich (Phil) Fan Mfg Co Inc
Lampco Lighting Fixture Co—Hasco Electric Corp
Lamplighter Products Co Inc—see Lightalarms Inc
Lancaster Glass Corp Lancaster Ohio
Lancaster Lens Co—see Lancaster Glass Corp
LANCE MARKER—Keyes-Davis Co
Land-Air Inc 7444 W Wilson Ave Chicago 31 Ill
Lantz Mfg Co Inc Valparaiso Ind
Lapp Insulator Co Inc 35 Gilbert St LeRoy NY
LAQUA—Fidelity Chemical Products Corp
Lakaus Mfg Co Inc LeRoy NY
Larco Inc Route 20 East Painesville Ohio
Larkin Lectro Products Co—see Central Transformer Corp
LaRose (W T) & Associates Inc 31 Ontario St Cohoes NY
Larson Instrument Co 24 Orchard St Tarrytown NY
LaSalle Products Inc—see Markel Electric Products Inc
Lastik Paint Inc 201 Iroquois Bldg Pittsburgh 13 Pa
Lastik Products Co Inc—see Lastik Paint Co
LATROBE—Fullman Mfg Co
Lau Blower Co 2001 Home Ave Dayton 7 Ohio
LAVOLAIN—Star Porcelain Co
LAWCO—Velocity Power Tool Co
LAY-CIT—Kearney (James R) Corp
LAY-IN—Square D Co
LAYTEX—Kaiser Aluminum & Chemical Sales Inc
LE CARBONE—Carbone Corp
LEADER—Keyes-Davis Co
Leader Lamp Mfg Co 476 Broome St NY 13 NY
LEAF-LITE LUMINUS—Luminous Ceilings Inc
LECTERN—Loge (J M) Sound Engineers
LECTERN-LYRIC—AOW Corp
LECTRI-LOK—Steber Mfg Co
LECTROFILTER—Coolerator Div McGraw-Edison Co
Lectrohm Inc 5560 Northwest Highway Chicago 30 Ill
LECTRONIC LECTERN—Radio Corp of America
LECTRONIC SENTRY—Joy Mfg Co
LEDEX—Leland (GH) Inc
LEDLOK—U S Expansion Bolt Co
Lee-Bert Inc 900 Lapeer St Saginaw Mich
Lee (Walter) Chemical Corp 1383 Seabury Ave Bronx 61 NY
Lee Electric Inc 566 52nd St West New York NJ
Leebaw Mfg Co 65 Wayne Ave Youngstown 2 Ohio
Leece-Neville Co 1374 E 51 St Cleveland 3 Ohio
Leecraft Mfg Co Inc 58 Greene St New York 12 NY
Leeds & Northrup Co 4970 Stenton Ave Phila 44 Pa
LEEFLUOR—Lee (Walter) Chemical Corp
Leesona Corp P O Box 1605 Providence 1 RI
Lehigh Fan & Blower Co—see Lehigh Fan & Blower Div
Lehigh Fan & Blower Div Fuller Co Catesauqua Pa
Leibfried (C H) Mfg Corp 95-101 Guernsey St Brooklyn 22 NY
Leigh Building Products Coopersville Mich
Leitch Engineering Corp—see Leitch-Huard
Leitch-Huard Corp Stark & Commercial Sts Manchester NH
LEKOLITE—Century Lighting Inc
LEKTRO-LOK—Linemaster Switch Corp
Leland (G H) Inc 123 Webster St Dayton 2 Ohio
Leland Electric Co 1501 Webster St Dayton 1 Ohio
Lenco Inc 350 W Adams St Jackson Mo
Lenk Mfg Co Franklin Ky
LENOX—Day-Brite Lighting Inc
LENSDRUM—Art Metal Co
LESTERLITE—Transolite Corp
LeTourneau (R G) Inc 2399 S MacArthur Longview Tex
LEV-O-LET—Leviton Mfg Co Inc
LEV-O-LITE—Leviton Mfg Co Inc
LEV-O-LOCK—Leviton Mfg Co Inc
LEVEL MASTER—Jo-Bell Products Inc
Leviton Mfg Co Inc 236 Greenpoint Ave Brooklyn 22 NY
LEVOLIER—McGill Mfg Co Inc
Lew Electric Fittings Co 627 W Lake St Chicago 6 Ill
Lewis Engineering Co 52 Rubber Ave Naugatuck Conn
Lewis-Shepard Products Inc 125 Walnut St Watertown Mass
Lewus Electric Co 1254 W Harrison St Chicago 7 Ill
LEXINGTON—Miller Co
Liberty Bell Mfg Co Swainsboro Ga
Licon Switch & Control Div Illinois Tool Works 6606 W Dakin St Chicago 34 Ill
Lidseen of North Carolina Inc 1000 First St Hayesville NC
Lidseen (Gustave Inc)—see Lidseen of North Carolina
LIFE GUARD—Dorsey (John E) Co
LIFE GUARD—Westinghouse Electric Corp Lamp Div
LIFE LINE—Westinghouse Electric Corp
LIFE-SIZE—Auth Electric Co Inc
LIFE-TIME—Billings & Spencer Co
LIFEAMATIC—Sasgen Derrick Co
LIFEGUARD—United Lighting & Ceiling Co
LIFETIME—Slater Electric & Mfg Co Inc
Lifetime Industries—see Lighting Products Inc
LIFETIME LIGHTING—Dynaseal Lighting Corp
LIFT STACKER—Allied Mfg & Sales Co
Lift Trucks Inc 2425 Spring Grove Ave Cincinnati 14 Ohio
Liftamatic—Sasgen Derrick Co
LIFTRUK—Silent Hoist & Crane Co
Light & Power Utilities Corp 1035 Firestone Blvd Memphis 7 Tenn
LIGHT WATCHMAN—Ripley Co Inc
Lightalarms Inc 95 Atlantic Ave Brooklyn 1 NY
LIGHTER LITE—Cable Electric Products Inc
LIGHTGUARD—Exide Industrial Div
Lighting Dynamics Inc 300 N Baldwin Park Blvd City of Industry Calif
Lighting Products Inc 1549 Park Ave West Highland Park Ill
Lightmore Appliance Corp 651-5 Driggs Ave Brooklyn 11 NY
LIGHTNING—Vaco Products Co
LIGHTNING LIFT—Atlas Overhead Door Co
Lightning Protection Engineers—see Security Mfg & Contracting Co
Lightolier Inc 346 Claremont Ave Jersey City 5 NJ
Lightonics P O Box 7211 Oakland 1 Calif
LIGHTRON—Condi-Lite Corp
LIGHTSCAPER—Magni Flood Inc
LIGHTSCAPER—Shalda Mfg Co Inc
LIGHTWARDEN—Electric Cord Co
LIGHTWHEEL—Silvray Lighting Inc
Lima Electric Motor Co Inc Findlay Road Lima Ohio
LIMB-LOPPER—Miller-Robinson Co
LIMIT-LOAD—Buffalo Forge Co
LIMITAMP—General Electric Co
LIMITRON—Bussmann Mfg Div McGraw-Edison Co
LINABESTOS—Keasbey & Mattison Co
LINC-THAW—Lincoln Electric Co
LINCOLN—Forston Co
LINCOLN—Sangamo Electric Co
Lincoln Electric Co 22801 St Clair Ave Cleveland 17 Ohio
LINCOLNDUCTOR—Lincoln Electric Co
LINCOLNTROL—Lincoln Electric Co
LINCOLNTROL—Sangamo Electric Co
LINCOLNWELD—Lincoln Electric Co
LINCWELDER—Lincoln Electric Co
Lindberg Engineering Co 2450 W Hubbard St Chicago 12 Ill
Lindell Electric Control Corp 384 Canal St New York 13 NY
LINE-A-MATIC—Stromberg Time Corp
LINE-A-SPEDE—Allis (Louis) Co
LINE-ARC—Electric Controller & Mfg Co
Line Electric Co 229 River St Orange NJ
LINE GUARD—Preformed Line Products Co
Line Material Co—see Line Material Industries
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis
LINE-O-HEAT—Smith-Gates Corp
LINE-O-LAMPS—Wiremold Co
LINE-O-LIFE—Carter Motor Co
LINE-O-METER—Simpson Electric Co
Linemaster Switch Corp Woodstock Conn
Link-Belt Co Prudential Plaza Chicago 1 Ill
LINKIT—Burndy Corp
LINOLITE—Frink Corp
Lint (Clyde W) 2323 W 18th St Chicago 8 Ill
Lintern Corp—See Larco Inc
Linton (Horace) Div Hess Goldsmith & Co Inc 1400 Broadway New York 18 NY
LIQUATITE—Electri-Flex Co
LIQUID ICE—Cool-ette Inc
LIQUID TITE—Electrical Fittings Corp
LITE BLOX—Guth (Edwin F) Co
LITE LINER—House-O-Lite Corp
LITE MITE—Stocker & Yale Inc
LITE-N-TUFF—Hamilton Caster & Mfg Co
LITE-UR-WAY—Edco International Corp
Litecontrol Corp 36 Pleasant St Watertown 72 Mass
Litecraft Mfg Corp 100 Dayton Ave Passaic NJ
LITEKRAFT—Cole (C W) & Co Inc
LITEMASTER—Art Specialty Co
LITEMASTER—Flexo International Corp
LITEMASTER—Globe Lighting Products Inc
Lithonia Lighting Products Co Box 206 Conyers Ga
Littelfuse Inc 1865 Miner St Des Plaines Ill
LITTLE CHAMP—Champion DeArment Tool Co
LITTLE DEVIL—Ohmite Mfg Co
LITTLE GIANT—Lenk Mfg Co
LITTLE INCH—Alkco Mfg Co
LITTLE MAJOR—Arro Expansion Bolt Co
LITTLE-SIX—Burgess Battery Co
LITTLE WIZARD—Round (David) & Son Inc
Littleford Bros Inc 453 E Pearl St Cincinnati 2 Ohio
Lloyd Johnson Co—see Johnson Mfg Co Inc
LLOYDS—Johnson Mfg Co Inc
LO-BRITE—Holophane Co Inc
LO-CARB—Capewell Mfg Co
LO-HED—American Engineering Co
LO-LOSS—National Electric Div H K Porter Co
LO-NOIZ-LEVEL—Allen Cooler & Ventilator Inc
LO-VOLT—Industrial Devices Inc
LO-X—BullDog Electric Products Div
LOAD-LIFT—American Pulley Co
LOAD LIFTER—Shaw-Box Crane & Hoist Div Manning Maxwell & Moore Inc
LOAD-MOBILE—American Pulley Co
LOAD SENTRY—Assembly Products Inc
LOADBUSTER—S & C Electric Co
LOADGUARD—R T & E Corp
LOADMASTER—Lewis-Shepard Products Inc
LOADSTAR—Fidelity Electric Co Inc
LOADSTAR—Leland Electric Co
LOBOY—Holophane Co Inc
LOCALITE—Fostoria Pressed Steel Corp
LOCK-ON—Eagle Electric Mfg Co Inc
LOCK-TITE—Thomas & Betts Co
LOCKLITE—Westinghouse Electric Corp Lighting Div
LOCTITE—American Sealants Co
LODESTAR—Chisholm-Moore Hoist Div
Loge (J M) Sound Engineers 2171 W Washington Blvd Los Angeles 18 Calif
LOK-A-BLOK—Ilsco Corp
LOK-IT—Holub Industries Inc
LOK-ON—Holub Industries Inc
LOKATOR—Edwards Co Inc
LOKFAST—Steber Mfg Co
LOKTITE—U S Expansion Bolt Co
London Chemical Co Inc 1535 N 31 Ave Melrose Park Ill
Long-Bell Lumber Co—see International Paper Co
LONG LIFE—Goodall Rubber Co
LONG-BELL—International Paper Co
LONG-LIFE—Marvel Lamp Co
LONGRIP—Ridge Tool Co
LOOV-O-LITE—Guth (Edwin F) Co
Lord-Taber Co Inc—see Castle Engineering Co
LORRAINE—Carbone Corp
LOSHAFT—Franklin Electric Co Inc
LOTEMP—Micro Instrument Co
LOUVE-ROCKET—Sun-Lite Mfg Co
LOUVERAY—Duro-Test Corp
LOUVRON—Lightolier Inc
LOVEX—Day-Brite Lighting Inc
LOVOLT—Woodhead (Daniel) Co
Lovsted (CM) & Co Inc 4000 W Marginal Way Seattle 6 Wash
LOW-PEAK—Bussmann Mfg Div McGraw-Edison Co
Lowell Insulated Wire Corp—see Coral Cable Co
LOXARMOR—Okonite Co
LOXIN—Star Expansion
LOXON—McGill Mfg Co Inc
LOXSWITCH—Denison (RB) Mfg Co
LUBO-JET—Trico Fuse Mfg Co
LUCETTE—Versen (Kurt) Co
Lucifer Furnaces Inc Neshaminy Pa
LUCO—Lukens (Thos F) Metal Co
Ludlow Mfg & Sales Co P O Box 101 Needham Heights 94 Mass
Lug-All Co—see Handy Angle Div Lug-All Co
LUG-IT—Thomas & Betts Co
Lukens (Thos F) Metal Co Hedley & Bath Sts Philadelphia 37 Pa
LUMA-CEILING—Pittsburgh Reflector Co
Luma Electric Equipment Co 1607 Coining Drive (P O Box 132) Toledo Ohio
LUMATROL—Micro Balancing Inc
Lumen Inc Moen Ave (P O Box 905) Joliet Ill

LUMEN-AREA—Electro Lighting Corp
LUMENITE—Collyer Insulated Wire Co
Lumenite Electronic Corp 407 S Dearborn St Chicago 5 Ill
LUMI-FLO—Benjamin Div Thomas Industries Inc
LUMI-PEND—Silvray Lighting Inc
LUMI-POST—Silvray Lighting Inc
LUMI-TONE—Pollak Luminescent Corp
LUMIGRID—Solar Light Mfg Co
Luminous Ceilings Inc 3701 N Ravenswood Ave Chicago 13 Ill
LUMIRAMA—Litecraft Mfg Co
LUMO—Appleton Electric Co
LUNAR—Versen (Kurt) Co
LUNDY—Specialties Inc
LUNGEN—Edwards Co Inc
LUSTERLAC—American Electric Cable Co
LUV-R-LOK—Lighting Products Inc
LUVE TILE—Wilson (J A) Lighting & Display Inc
LUVR-LUMINUS—Luminous Ceilings Inc
LUX-GRILL—House-O-Lite Corp
LUXAIRE—Pfaff & Kendall
Luxor Lighting Products Inc 350 5th Ave New York 1 NY
LUXTROL—Superior Electric Co
LUXWOOD—Moe Light Div Thomas Industries Inc
LYNN—Vaco Products Co
Lyon Rural Electric Co 2075 Moore St San Diego 12 Calif
LYTECASTER—Lightolier Inc
LYTELINE—Lightolier Inc
LYTESCAPE—Lightolier Inc
LYTESPAN—Lightolier Inc

M

M-SCOPE—Fisher Research Laboratory Inc
ME—Marathon Electric Mfg Corp
M H Standard Co—see Versabar Corp
MPAC—Cutler-Hammer Inc
M S A SHOCKGARD—Mine Safety Appliances Co
M & T—Metal & Thermit Corp
M & T Welding Products Corp 703 37th Ave Oakland Calif
MTC—Marcus Transformer Co Inc
M & W Electric Mfg Co Inc S Walnut St (P O Box 87) East Palestine Ohio
MACHETA—Aerovent Fan Co Inc
Machinery Electrification Inc 56 Hudson St Northboro Mass
Madison Equipment Co 5405 Detroit Ave Cleveland 2 Ohio
MAG-A-TROL—Ward Leonard Electric Co
MAGAN-TRAN—Mid-States Welder Mfg Co
MAGIC FRAME—Electro Lighting Corp
MAGIC TOUCH—Rodale Mfg Co Inc
MAGIC WAND—Sticht (Herman H) Co Inc
MAGICLITE—Guth (Edwin F) Co
MAGMOTOR—Carter Motor Co
MAGNA—Ainsworth Lighting Inc
MAGNA—Auto Arc-Weld Mfg Co
MAGNA CHARGER—Fox Products Co
MAGNA-SET—Precision Thermometer & Instrument Co
MAGNA WELDER—Auto Arc-Weld Mfg Co
MAGNALITE—Light & Power Utilities Corp
MAGNAPULSE—Gemco Electric Co
MAGNATORC—Hansen Mfg Co Inc
Magnatran Inc P O Box 211 Kearny NJ
MAGNATROL—Century Lighting Inc
Magnatrol Valve Corp 67 Fifth Ave Hawthorne NJ
MAGNE-LOOP—Memco Engineering & Mfg Co Inc
MAGNE TREATER—Radio Frequency Laboratories Inc
MAGNEBRAKE—Vickers Inc
MAGNECLUTCH—Vickers Inc
Magnetics Inc Control Div Box 391 Butler Pa
MAGNETRIP—Zinsco Electrical Products
Magnetrol Inc 2110 S Marshall Blvd Chicago 23 Ill
MAGNETTE—Heinemann Electric Co
Magni Flood Inc 50 Crary Ave Mt Vernon NY
MAGNI-WHIRL—Blue M Electric Co
MAGNISTROL—Acme Electric Corp
MAGOHM—Electric Regulator Corp
MAIN STREETER—Westinghouse Electric Corp Lighting Div
MAINLINE—Crane (HW) Co
MAINLINER—Westinghouse Electric Corp Lighting Div
Majestic Metal Spinning & Stamping Co Inc 537 Sackett St Brooklyn 17 NY
MAJOR—Gem Electric Mfg Co Inc
Major Equipment Co Inc 4603 W Fullerton Ave Chicago 39 Ill
MAL-LEADS—Arro Expansion Bolt Co
Mall Tool Co 25000 S Western Ave Park Forest Ill
MALLDRILL—Mall Tool Co
Mallory (P R) & Co Inc 30 S Gray St Indianapolis 6 Ind
MALLSAW—Mall Tool Co
MANCHEX—Exide Industrial Div Electric Storage Battery Co
MANGRID—Driver (Wilbur B) Co
MANHATTAN—Raybestos-Manhattan Inc
Manning (RA) Associates—see Manning (RA) Co Inc
Manning (RA) Co Inc 1810 North Ave Sheboygan Wis
Manning Maxwell & Moore Inc 250 E Main St Stratford Conn
MANSON—Okonite Co
MANULUX—Major Equipment Co Inc
Marathon Battery Co P O Box 298 Wausau Wis
Marathon Electric Mfg Corp Wasau Wis
Marathon Special Products Corp 12th & Cranberry Sts Erie Pa
Marbelite Co Inc 179 N 10 St Brooklyn 11 NY
Marble Card Electric Corp—see Marble Electric Corp
Marble Electric Corp Gladstone Mich
MARCO—Marvin Electric Mfg Co
MARCO—Progress Mfg Co Inc
Marco Industries 207 S Helena St Anaheim Calif
Marcus Transformer Co Inc Leesville Ave Rahway NJ
MARGLO—Marvin Electric Mfg Co
Marion Electrical Instrument Co—see Marion Instrument Div Minneapolis-Honeywell Reg Co
Marion Instrument Div Minneapolis-Honeywell Regulator Co Grenier Field Manchester NH
Mark (Clayton) & Co 1900 Dempster St Evanston Ill
MARK-TIME—Rhodes (M H) Inc
MARKARRIER—Premax Products Div Chisholm-Ryder Co Inc
Markel Electric Products Inc 145 Seneca St Buffalo 3 NY
Markel (L Frank) & Sons Norristown Pa
Market Forge Materials Handling Equipment—see American Pulley Co
Marks Mfg Co 700 N Carpenter St Chicago 22 Ill
MARKSMAN—West Instrument Corp
Markstone Mfg Co 1531 N Kingsbury Chicago 22 Illinois
MARLO—Sperti Faraday Inc
Marlou Lights Inc Fanwood NJ
Marquette Electric Switchboard Co 311 N Desplaines St Chicago 6 Ill
MARR—Rattan Mfg Co
Marsh (Jas P) Corp—see Marsh Instrument Company
Marsh Heating Equipment Corp—see Marsh (Jas P) Corp
Marsh Refrigeration Equipment Co—see Marsh (Jas P) Corp
Marsh Instrument Co 3501 Howard St Skokie Ill
Marshall (John) Associates Inc Box 2463 Bridgeport 8 Conn
Martin Fan & Blower Co 4634 W 21st Pl Chicago 50 Ill
Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio
MARTLITE—Ainsworth Lighting Inc
MARVEL—Pullman Vacuum Cleaner Corp
MARVEL—United Electric Motor Co
Marvel Fluorescent Mfg Co—see Marvel Lamp Co
Marvel Lamp Co 307 Newark St Hoboken NJ
Marvel Rack Mfg Co Inc 96 43rd Ave N E Minneapolis 21 Minn
MARVELITE—Marvel Lamp Co
Marvin Electric Mfg Co 648 Santa Fe Ave Los Angeles 21 Calif
Marvin Mfg Co—see Marvin Electric Mfg Co
Marviray Inc—see Seaboard Products Corp
MASCO FONE—Simpson (Mark) Mfg Co Inc
MASCOT—Simpson (Mark) Mfg Co Inc
Mason (LE) Co 98 Business St (Hyde Park) Boston 36 Mass
Massey (A H) Inc 111 3rd St (P O Box 206) Derby Conn
Massey-Ferguson Industrial Div Massey-Ferguson Inc 1009 S West St Wichita 13N Kans
MASTER—Kaiser Aluminum of Chemical Sales Inc
Master Electric Div Reliance Electric & Engineering Co 126 Davis Ave Dayton 1 Ohio
MASTER-LIGHT—Carpenter Mfg Co
MASTER-MITE—Marsh Instrument Co
MASTER-PRO—Cincinnati Time Recorder Co
MASTER-TEST—Marsh Instrument Co
MASTERBEAM—MiroFlector Co Inc
Mastercraft Plastics Co Inc 95-01 150th St Jamaica 35 NY
MASTERLINE—Blonder-Tongue Laboratories Inc
Masterlite Mfg Co 2758 Kensington Ave Phila Pa
MATCHLESS—Chisholm-Moore Hoist Div
Matthews (W N) Corp—see Chance (A B) Co
Matthews Electric Heater Mfg Co Albertville Ala
Max-A-Loc Inc El Monte Calif
MAX-FLO—Shaw-Perkins Mfg Co
MAXAW—Cummins Portable Tool Div John Oster Mfg Co
Maxwell Equipment Co—see Emhart Mfg Co
McCabe-Powers Body Co 5900 N Broadway St Louis 15 Mo
McCaffrey Mfg & Supply Co 1840 W 14 St Chicago 8 Ill
McCARTHY—Salem Tool Co
McCarthy Electric Co 9640 Grinnell Detroit 13 Mich
McColpin-Christie Corp—see Christie Electric Corp
McCorkle (D H) Co Box 97 Station A Berkeley Calif
McDonald Mfg Co—see Sierra Electric Corp
McDonnell & Miller Inc 3500 N Spaulding Ave Chicago 18 Ill
McFarland (L D) Co McFarland Bldg Sandpoint Idaho
McGill Mfg Co Inc Valparaiso Ind
McK—McKinley (Ben P) Co
McKee Div Thatcher Glass Mfg Co Inc Jeannette Pa
McKee Glass Co—see McKee Div Thatcher Glass Mfg Co Inc
McKinley (Ben P) Co 522 S Clinton St Chicago 7 Ill
McKinley-Mockenhaupt Co—see McKinley (Ben P) Co
McLarty Systems 2600 Dickman Rd Battle Creek Mich
McLean Engineering Laboratories 70 Washington Rd (P O Box 228) Princeton NJ
McPhilben Mfg Co Inc 1329 Willoughby Ave Brooklyn 37 NY
Mechanical Industries Production Co 217-223 Ash St Akon 8 Ohio
Mechanical Products Inc 1824 River St Jackson Mich
Meco Metal Box & Panel Mfg Co Inc 2522 W Huntington St Phila 32 Pa
MEGGER—Biddle (James G) Co
MEGOHM TEST—Davenport Mfg Co
MEGOHMER—Sticht (Herman H) Co Inc
Meier Electric and Machine Co Inc 3525 E Washington St Indianapolis 7 Ind
Meierjohan-Wengler 1102 W 9th St Cincinnati 3 Ohio
MELETRON—Barksdale Valves
MELL-O-RAY—Eagle Electric Mfg Co Inc
MELOCALL—Edwards Co Inc
MELODY BELL—Cable Electric Products Inc
MELVIN—Sun-Lite Mfg Co
Memco Engineering & Mfg Co Inc Commack LI NY
Mend-It Sleeve Mfg Co 3125 Gloria Terrace Lafayette Calif
Mephisto Tool Co Inc Box 16 Hudson NY
MERC-AMATIC—Tigerman Engineering Co
MERCHANT—Miller Co
MERCO—Corona Mfg Corp
MERCO-FLOOD—Radiant Lamp Corp
MERCO LITE—Great Northern Mfg Corp
MERCO-SPOT—Radiant Lamp Corp
MERCO-WHITE—Radiant Lamp Corp
Mercoid Corp 4201 W Belmont Ave Chicago 41 Ill
MERCONTROL—Mercoid Corp
MERCU-LITE—Sterner Industries
MERCURY—General Control Co
MERCURY—Vulcan Electric Co
Mercury Hydraulics 1632-46 Wazee St Denver 2 Colo
Mercury Mfg Co 4700 W Division St Chicago Ill
Merwin Mfg Co 19th & German Sts Erie Pa
METAL ROLLING—American Silver Co
Metal & Thermit Corp Rahway NJ
Metalcraft Products Co Inc 6225 State Rd Philadelphia 35 Pa
Metalectrics Inc 677 Broadway NY 12 NY
METALEX—Willard Storage Battery Div Electric Storage Battery Co
Metals & Controls Div Texas Instruments Inc 34 Forest St Attleboro Mass
METARAY—Wiegand (Edwin L) Co
METCO LIGHTING—Metalcraft Products Co Inc
METEOR—Associated American Winding Mach Inc
METEOR—Chisholm-Moore Hoist Div Columbus McKinnon Chain Corp
METEOR—Metalcraft Products Co Inc
METEOR—Wheeler Reflector Co
Meteor Electric Co Inc—see Leviton Mfg Co Inc
Meteor Mfg Corp Emporium Pa
Meter Devices Co 1001 Prospect Ave SW Canton 6 Ohio
METER-MATIC—International Register Co
METER-MATIC—Leitch-Huard Corp
Meters Inc 5353 N Keystone Ave Indianapolis 20 Ind
METL-CAN—Pyramid Electric Co
Metro Casting Co Inc 47 Grattan St Brooklyn 37 NY
Metron Instrument Co 432 Lincoln St Denver 3 Colo
Metropolitan Device Corp—see Murray Mfg Corp
Meyer Machine Inc Red Wing Minn
Mica Fabricating Co 53 Central Ave Rochelle Park NJ
MICA-GLAS—National Electric Coil Div
Mica Products Mfg Co—see Mica Fabricating Co
Micacraft Products Inc 701-03 McCarter Highway Newark 5 NJ
MICALITE—Induction Heating Corp
MICEPAK—Electric Products Co
Michigan Fluorescent Light Div 393 Orchard Lake Ave Pontiac Mich
Michigan Oven Co 415 Brainard Detroit 1 Mich
Mico Instrument Co 80 Trowbridge St Cambridge 38 Mass
MICRELAY—Ebert Electronics Corp
Micro Balancing Inc 191 Herricks Rd Garden City Pk NY
MICRO-HAT—MiroFlector Co Inc
MICRO-LITE—Burton Mfg Co
MICRO-MOTOR—Redmond Co Inc
MICRO-NAMIC—Micro Balancing Inc
Micro Switch Corp—see Micro Switch Div
Micro Switch Div of Minneapolis-Honeywell Regulator Co Chicago & Spring Freeport Ill
MICROFIN—Wiegand (Edwin L) Co
MICROFLO—General Control Co
MICROLITE—MiroFlector Co Inc
MICROLOY—Capewell Mfg Co
MICRONAIRE—Raytheon Mfg Co
MICROTESTER—Simpson Electric Co
MID-JET—Electro Devices Co Inc
MID-RIP—General Cable Corp
Mid-States Welder Mfg Co 6025 S Ashland Ave Chicago 36 Ill
Mid-West Chandelier Co 15th & Gentry (P O Box 7365) North Kansas City 16 Mo
MIDGET—Swivelier Co Inc
Midget Heater & Specialty Co 2801 Pacific Ave Tacoma 4 Wash
MIDGET-RAY—Duray Fluorescent Mfg Co
MIDGET TALK—Simpson (Mark) Mfg Co Inc
MIDGETESTER—Simpson Electric Co
Midland Industrial Div Harrison Paint & Varnish Co 1329 Harrison Ave SW Canton 1 Ohio
Midland Paint & Varnish Co—see Harrison Paint & Varnish Co
Midland Wire Corp—see Paranite Wire & Cable Div Essex Wire Corp
Midwest Electric Mfg Co 1639 Walnut St Chicago 12 Ill
Midwest Electric Products Inc 1515 N Front St Mankato Minn
Midwest Lighting Products Co P O Box 536 Edgewater Branch Cleveland 7 Ohio
MIGHTY MIDGET—Coffing Hoist Div
MIGHTY MIDGET—Stanley Electric Tools
MIGHTY MITE—Mechanical Industries Production Co
MIGHTY MITE—Remington Arms Co Inc
MIKROHM—Superior Electric Co
MIL-CARB—Wrought Washer Mfg Co
MIL-WROT—Wrought Washer Mfg Co
MILESTONE—Jefferson Electric Co
MILL-O-MATIC—Luxor Lighting Products Inc
Miller Co Illuminating Div 99 Center St Meriden Conn

Miller Electric Mfg Co Inc 718 S Bound St Appleton Wis
Miller (Sandford) Co 11 Lynch St Brooklyn 11 NY
Miller Equipment Co Inc 13th & New Streets Franklin Pa
Miller Harris Instrument Co 1134 S First St Milwaukee 4 Wis
Miller-Robinson Co 7007 Avalon Blvd Los Angeles 3 Calif
Millerbernd Mfg Co Winsted Minn
Millers Falls Co 57 Wells St Greenfield Mass
MILLITE—Westinghouse Electric Corp Lighting Div
Milos System Devices—see United States Petroleum Co
MILWAUKEE—Northern Light Co
Milwaukee Electric Tool Corp 5368 W State St Milwaukee 8 Wis
Milwaukee Parts Corp 607-15 S Sixth St Milwaukee 4 Wis
MILWAUKEE WROT—Wrought Washer Mfg Co
MIN-A-CLIPS—Minerallic Electric Co
MINALITE—Westinghouse Electric Corp Lamp Div
MINALITH—Koppers Co Inc Wood Preserving Div
Mine Safety Appliances Co 201 N Braddock Ave Pittsburgh 8 Pa
MINEON—Drake Mfg Co
Minerallac Electric Co 25 N Peoria St Chicago 7 Ill
Mines Equipment Co—see Joy Mfg Co Electrical Products Div
MINI BREAKER—Mechanical Products Inc
MINI-CELL—Neo-Ray Products Inc
MINI-GATOR—Mueller Electric Co
MINI-ISOLATOR—Javex
MINI-LARM—Russell & Stoll Co Inc
MINI-MARKER—Westline Products Div Western Lithograph Co
MINI-PLATES—Javex
MINI-SOCKET—Javex
MINI-VOLT—Industrial Devices Inc
MINICUBE—Fullerton Mfg Co
MINIRELAY—Ebert Electronics Corp
Minneapolis Electric & Construction Co 80 S 12 St Minneapolis 3 Minn
Minneapolis-Honeywell Regulator Co 2753 Fourth Ave S Minneapolis 8 Minn
Minneapolis-Honeywell Regulator Co Boston Div 40 Life St Boston 35 Mass
Minneapolis-Honeywell Regulator Co Industrial Div Wayne & Windrim Aves Phila 44 Pa
Minnesota Mining & Mfg Co Electrical Products Div 900 Bush Ave St Paul 6 Minn
Minnesota Mining & Mfg Co Irvington Div 6 Argyle Terrace Irvington 11 NJ
MINUTE MOUNT—Progress Mfg Co Inc
MIRAC-O-LITE—Cutler Light Mfg Co
MIRACLE—Okun (A L) Co Inc
MIRACO—Mitchell Rand Insulation Co
MiroFlector Co Inc 40 Bayview Ave Inwood LI NY
Mirro Co—see Aluminum Co of America
MIRRORSCOPE—Simpson Electric Co
Misener Mfg Co Inc 202 Walton St Syracuse 2 NY
Miskella Infra-Red Co E 73rd & Grand Ave Cleveland 4 Ohio
MISSING LINK—Mid-States Welder Mfg Co
Mission Appliance Corp Hyde Park Station Los Angeles 43 Calif
Mission Western Engineers Inc—see Western Gear Corp
Mitchell Industries Inc Box 17 Municipal Airport Mineral Wells Tex
Mitchell Lighting Div Compco Corp 1800 N Spaulding Ave Chicago 47 Ill
Mitchell Mfg Co 3200 W Peterson Ave Chicago 45 Ill
Mitchell Moulding Co 1501 Circle Ave Forest Park Ill
Mitchell Rand Insulation Co 51 Murray St NY 7 NY
Mitchell-Rand Mfg Corp Insulation Div—see Mitchell Rand Insulation Co
MITCO—Mitchell Moulding Co
MITEE—International Electric Fence Co Inc
MITI-MAST—Utility Service Co Inc
MIX-A-PHONE—Simpson (Mark) Mfg Co Inc
MOBIL BREEZE—Frigid Inc
Mobile Aerial Towers Inc 1730 N Harrison St Fort Wayne Ind
MOBILEX—Day-Brite Lighting Inc
MOCO—Michigan Oven Co
Modern Electric Laboratory—see Blue M Electric Co
Modern Light Co Inc 7809 Maplewood Industrial Court St Louis 17 Mo
Modern Swimming Pool Co Inc 1 Holland Ave White Plains NY
MODERNAIRE—Electro Lighting Corp
Modernheat Cable Corp P O Box 754 Kingsport Tenn
MODU-AIRE—United States Air Conditioning Corp
MODU GLO—Marvin Electric Mfg Co
MODU-LUMINUS—Luminous Ceilings Inc
MODU-WAVE—Sciaky Bros Inc
MODULAR—Couch (S H) Co Inc
MODULITE—Electronic Control Corp
MODULITE—Major Equipment Co Inc
MODULUME—LAM Inc
Moe Light Div Thomas Industries Inc 410 S 3rd St Louisville Ky
MOHAWK—Frigid Inc
MOHAWK—Surrette Storage Battery Co Inc
MOIST-O-GRAPH—Minneapolis-Honeywell Regulator Co Industrial Div
MOISTURE MAGNET—Remington Corp
Moldcast Mfg Co 236 South St Newark 5 NJ
MOLE—Burndy Corp
Mole-Richardson Co 937 N Sycamore Ave Hollywood 38 Calif
MOLIMITER—Burndy Corp
Molly Corp 230 N Fifth St Reading Pa
MOLOCHIL—Capewell Mfg Co
Moloney Electric Co 5390 Bircher Blvd St Louis 20 Mo
MON-O-LAG—Monarch Electric Corp
Niagara Transforme. Corp 1751 Dale Rd Buffalo 25 NY
Mona Industries Inc Paterson 17 NJ
MONAMINE—Mona Industries Inc
Monarch Electric Corp 118 E First St Jamestown NY
Monarch Fuse Co Ltd—see Monarch Electric Corp
Monarch Lighting Fixtures Corp—see Ender-Monarch Corp
MONASTRIP—Mona Industries Inc
MONELITE—Dockson Corp
Monitor Controller Co 99 Grove St Rockland Mass
MONITROL—Monitor Controller Co
MONO-BOLT—Chance (A B) Co
MONO MOTOR—Redmond Co Inc
MONOGRAM—Refrigerating Specialties Co
MONOLARM—Russell & Stoll Co Inc
MONOMAST—Hyster Co
MONOTUBE—Union Metal Mfg Co
MONOWATT—General Electric Co
MONOWELD—All-State Welding Alloys Co Inc
MONSON—Portland-Monson Slate Co
Moon Mfg Co 108 N Jefferson St Chicago 6 Ill
MOORE—Chisholm-Moore Hoist Div
MORELITE—Rambusch Decorating Co
MORPHO—Cannon Electric Co
Morrison Steel Products Inc 601 Amherst St Buffalo 7 NY
Morrow Co 400 W Madison St Chicago 6 Ill
Morse (Frank W) Co 354 Congress St Boston 10 Mass
Morse Chain Co Borg Warner Corp Ithaca NY
Mossman (Donald P) Inc P O Box 265 Brewster NY
MOTO-LIFT—Safway Steel Products Inc
Moto-Truc Co 1953 E 59 St Cleveland 3 Ohio
MOTODRIVE—Reeves Pulley Co
MOTOMOUNT—U S Electrical Motors Inc
Motor Generator Corp—see Hobart Bros
MOTOR SENTINEL—Bryant Electric Co
Motor X Products Co—see Air-Hydraulics of Indiana
MOTORDOR—Broan Mfg Co Inc
MOTORDUCERS—Falk Corp
Motoresearch Co 1600 Junction Ave Racine Wis
MOTORLITE—Ward Leonard Electric Co
Motorola Communications & Electronics Inc 4501 W Augusta Blvd Chicago 51 Ill
MOTORTRON—Bussmann Mfg Div McGraw-Edison Co
MOTOTROL—Automatic Control Co
MOTRAC—Motorola Communications & Electronics Inc
Mueller Climatrol Div Worthington Corp 2005 W Oklahoma Ave Milwaukee 1 Wis
Mueller Electric Co 1555G E 31 St Cleveland 14 Ohio
Mueller (L J) Furnace Co—see Mueller Climatrol Div
Mullenbach Electrical Mfg Co—see Mullenbach Div
Mullenbach Div Electric Machinery Mfg Co 2100 E 27 St Los Angeles 58 Calif
Mult-A-Frame Div Ainsworth Precision Castings Co 1471-77 E Atwater St Detroit 7 Mich
MULTALARM—Automatic Control Co
MULTI—Duro Fittings Co
Multi-Amp Corp—see Multi-Amp Div
Multi-Amp Div Multi-Amp Electronic Corp 465 Lehigh Ave Union NJ
MULTI-BREAKER—Square D Co
MULTI-CALKS—Rawlplug Co Inc
MULTI-COM—Radio Corp of America
MULTI-DIAMETER—U S Expansion Bolt Co
MULTI-DUTY—Emerson Electric Mfg Co
Multi Electric Mfg Inc 4223 W Lake St Chicago 24 Ill
MULTI-MOUNT—Blackburn (Jasper) Corp
MULTI-MOUNT—Sterling Electric Motors Inc
MULTI-SIZE—Diamond Expansion Bolt Co Inc
MULTI-START—Scranton Storage Battery Corp
MULTI-TAC—Simpson (Mark) Mfg Co Inc
MULTI-TAP—Woodhead (Daniel) Co
MULTI-USE—U S Expansion Bolt Co
MULTI-VENT—Pyle-National Co
MULTIFONE—Simpson (Mark) Mfg Co Inc
MULTIGUARD—Lincoln Electric Co
MULTIPLE UNIT—Hevi Duty Electric Co
MULTISCOPIC—Kulka Electric Corp
MULTISTAK—Lake Shore Electric Corp
MULTITAP—Anderson (Albert & JM) Mfg Co
MULTUMITE—I-T-E Circuit Breaker Co
Muncie Gear Works Inc P O Box 433 Cordele Ga
MUREX—Metal & Thermit Corp
Murray (D A) Co Inc 632 N Mill St Tipton Ind
Murray Equipment Co Inc 14011 Oakland Ave Detroit 3 Mich
Murray Mfg Corp 1250 Atlantic Ave Brooklyn 16 NY
MUSI-TALK—Fanon Electronic Industries Inc
Mutual Foundry & Machine Co—see Potter & Rayfield Inc
MY-T-MIDGET—American Rectifier Corp
Mycalex Corp of America 125 Clifton Blvd Clifton NJ
Mystik Adhesive Products Inc 2635 N Kildare Ave Chicago 39 Ill

N

NE—National Electric Div H K Porter Co
N E BEND—Burbank Electrical Products
NEM—National Engineering & Mfg Co
N J—New Jersey Porcelain Co Inc
N L Corp 2480 E 22 St Cleveland 15 Ohio
N T C—Keystone Carbon Co Inc
N W L—Nothelfer Winding Labs Inc
N Y Revolving Portable Elevator Co—see Revolvator Co
NAIL-IT—Eagle Electric Mfg Co Inc
NALCO—National Lead Co
NALCO—North American Electric Lamp Co
NALCOBRITE—North American Electric Lamp Co
Nankervis (Geo L) Co 15300 Fullerton Ave Detroit 27 Mich
NARADRECT—Narragansett Wire Co
NARADUCT—Narragansett Wire Co
NARAWIRE—Narragansett Wire Co
NARAX—Narragansett Wire Co
Narragansett Wire Co 541 Pawtucket Ave Pawtucket RI
Natale Machine & Tool Co 339 Highway #17 Carlstadt NJ
Natco Corp 327 Fifth Ave Pittsburgh 22 Pa
NATIONAL—General Hardware Mfg Co Inc
National Acme Co Electrical Controls Div 170 E 131 St Cleveland 8 Ohio
National Appliance Co—see Ventrola Mfg Co
National Band & Tag Co 721 York St Newport Ky
National Carbon Co 30 E 42 St New York 17 NY
National Cathode Corp 317 E 34 St New York 16 NY
National Decalcomania Corp 236-38-40 N 60 St Phila 39 Pa
National Electric Coil Div McGraw-Edison Co 800 King Ave Columbus 16 Ohio
National Electric Controller Co 7070 Glenwood Ave Chicago 26 Ill
National Electric Div H K Porter Co Inc Porter Bldg Pittsburgh 19 Pa
National Electric Welding Machines Co 1846-1916 N Trumbull St Bay City Mich
National Engineering & Mfg Co 16th & Lamine Sts Sedalia Mo
National Fireproofing Corp—see Natco Corp
National Jerrold Systems Inc—see Jerrold Electronics Corp
NATIONAL-LAKE—National Time & Signal Corp
National Lead Co 111 Broadway NY 6 NY
National Pole & Treating Co—see National Pole & Treating Div
National Pole & Treating Div Minnesota & Ontario Paper Co 500 Investors Bldg Minneapolis 2 Minn
National Poultry Band Co—see National Band & Tag Co
National Price Service—see Henderson-Hazel Corp
NATIONAL RHEOSTAT—National Electric Controller Co
National Specialties Co Inc 1902 Howell St Ft Wayne 7 Ind
National Super Service Co 1946 N 13 St Toledo Ohio
National Supply Co Tubular Div Two Gateway Center (P O Box 416) Pittsburgh 30 Pa
National Time & Signal Corp 21800 Wyoming Ave Detroit 37 Mich
National Varnished Products Corp—see Natvar Corp
NATLOOP—National Electric Coil Div
NATSCO—National Time & Signal Corp
NATURLITE—Light & Power Utilities Corp
Natvar Corp 211 Randolph Ave Woodbridge NJ
NAUTILUS—Linemaster Switch Corp
Naybor (E V) Laboratories Inc 26 Manorhaven Blvd Port Washington NY
NE-O-LITE—Speedex Mfg Co
NEASBESTOS—National Electric Div H K Porter Co
NEATPAK—Federated Metals Div American Smelting & Refining Co
NECCOBOND—National Electric Coil Div
NELEX—Nelson Electric Mfg Co
Nelson Electric Mfg Co P O Box 5385 Tulsa Okla
Nemco Electric Co 210 Second Ave Seattle 4 Wash
NEMCRAFT—Nemco Electric Co
NEO-GLO—Markel Electric Products Inc
Neo-Ray Products Inc 315 E 22 St NY 10 NY
NEO-SOL—Charleston Rubber Co
NEO-TIME—Electric Controller & Mfg Co
NEOCORK—Auburn Mfg Co
NEOFIL—Bishop Mfg Corp
NEOLAY—Kaiser Aluminum & Chemical Sales Inc
NEOLINE—Anaconda Wire & Cable Co
NEOSIGN—Anaconda Wire & Cable Co
NEOTEL—General Cable Corp
NEOTEX—Woodhead (Daniel) Co
NEOTROL—Electric Controller & Mfg Co
NEPCO—National Electric Div H K Porter Co
NEPCO-LOK—National Electric Div H K Porter Co
NEPCO-SIL—National Electric Div H K Porter Co
NEPCODUCT—National Electric Div H K Porter Co
NEPCONOL—National Electric Div H K Porter Co
Nepo Mfg Co 4230 N Sayre Chicago 34 Ill
NEPTUNE—Recora Co Inc
NEUTRO—Dunton (M W) Co
NEVA GLARE—Marlou Lights Inc
NEVER CLOG—Pullman Vacuum Cleaner Corp
NEVER-CREEP—Chance (A B) Co
NEVER-SLIP—Miller Equipment Co Inc
New England Carbide Tool Co Inc 55 Commercial St Medford 55 Mass
New England Electrical Works Inc 365 Main St Lisbon NH
New Jersey Fire Alarm Co—see Newark District Telegraph Co
New Jersey Meter Co Inc 350 Leland Ave Plainfield NJ
New Jersey Porcelain Co Inc Plum St & NY Ave (P O Box 908) Trenton 5 NJ
New Jersey Zinc Co 160 Front St New York 38 NY
NEW YORKER—Sun-Lite Mfg Co
Newage Industries Inc 222 York Rd Jenkintown Pa
Newage International Inc—see Newage Industries Inc
Newark District Telegraph Co 372 Plane St Newark 2 NJ
Newart Mfg Co 6725 Machinery Ave Cleveland Ohio
Newcomb Audio Products Co 6824 Lexington Ave Hollywood 38 Calif
Newman Electric Motors Inc 357 Wilson Ave Newark 5 NJ

NIAGRITE—Johns-Manville
Nicad Div Gould-National Batteries Inc Easthampton Mass
Nichols Wire & Aluminum Co 1725 Rockingham Rd Davenport Iowa
Nickel Cadmium Battery Corp—see Nicad Div
NICRO—Fresh'nd-Aire Div Cory Corp
NIGHTINGALE—Adjustable Fixture Co
Nikoh Tube Co 5000 S Whipple St Chicago 32 Ill
NILSTAIN—Driver (Wilbur B) Co
9000 ARC—Mid-States Welder Mfg Co
99999 FINE—American Silver Co Inc
NITE-BEAM—Eagle Electric Mfg Co Inc
NITEAIR—Lau Blower Co
NITELIGHTER—Fisher-Pierce Co
NO FLAME COR—Cornish Wire Co Inc
NO-LIFT—Self-Lifting Piano Truck Co
NO-SHOK—Bell Electric Co
NO-SPARK—Co-operative Utilities Co Inc
NOBATRON—Sorensen & Co Inc
NOBRUSH—Georator Corp
NODRSEAL—Johns-Manville
Noel Mfg Co 3 W 18 St New York 11 NY
NOKORODE—Dunton (M W) Co
NOLO—Auburn Mfg Co
NORBLO—Northern Blower Co
Nordberg Mfg Co 3073 S Chase Ave Milwaukee 1 Wis
NORK—General Hardware Mfg Co Inc
Norky Mfg Corp P O Box 669 Covington Ky
NORLICO—Norhtern Light Co
NORMAN ELECTRIC CO—Star-A-Electric Mfg Co Inc
Normandy Electric Wire Corp 125 Second St Brooklyn 31 NY
NORSOLV—Northwoods Mfg Chemists Inc
North American Electric Lamp Co 1520 North 13th St St Louis 6 Mo
NORTH-LITE—Great Northern Mfg Corp
North Shore Nameplate Inc—see North Shore Nameplate Div Anodyne Inc
North Shore Nampelate Div Anodyne Inc 214-27 Northern Blvd Bayside NY
Northbrook Products Inc Industrial Div 624 S Michigan Ave Chicago 5 Ill
Northern Blower Co 6434 Barberton Ave Cleveland 2 Ohio
Northern Incandescent Lamp Co. 1 Newark St Hoboken NJ
Northern Light Co 1661 N Water St Milwaukee 2 Wis
NORTHERN LIGHTS—Northern Incandescent Lamp Co
Northwestern Electric Co 1750 N Springfield Ave Chicago 47 Ill
NORTHWIND—Emerson Electric Mfg Co
Northwoods Mfg Chemists Inc Porterfield Wis
Nothelfer Winding Labs Inc 5 Albemarle Ave (P O Box 455) Trenton 3 NJ
Novelty Lighting Corp—see N L Corp
NOVOID—G & W Electric Specialty Co
NU-BLAC—Star Porcelain Co
NU-BRAZE—American Silver Co Inc
NU-LITE—Dependable Electric Mfg Co Inc
NU-WAY—Marshall (John) Associates Inc
NUARC—Electric Arc Inc
NUBEL—Edwards Co Inc
Nutone Inc Madison & Red Bank Roads Cincinnati 27 Ohio
Nutting Truck and Caster Co 1201 W Division St Faribault Minn
NUWAY—Jordan Electric Products Div Electric Storage Battery Co
Nye Tool Co 4120-30 Fullerton Ave Chicago 32 Ill
NYLAFLOW—Polymer Corp
NYLASINT—Polymer Corp
NYLATRON—Polymer Corp
NYLAWELD—Polymer Corp
NYLCLAD—Belden Mfg Co
NYLEZE—Phelps Dodge Copper Products Corp
NYLOX—Hardman (H V) Co Inc
NYLTEXENAMEL—Belden Mfg Co
NYTROL—Walker Brothers

O

O-B—Ohio Brass Co
O-E—Arro Expansion Bolt Co
OEM—Oliver Electrical Mfg Co
OK—Appleton Rubber Co Inc
O K—General Cable Corp
O-K—Henderson Electric Co
O P BREAKER—Adam (Frank) Electric Co
O-PAC—Opad Electric Co
O-Z—Zernickow (O) Co
O Z Electrical Mfg Co Inc 262 Bond St Brooklyn 17 NY
OAMCO—Overbagh & Ayers Mfg Co
O'Brien Electric Corp 6514 Santa Monica Blvd Hollywood 38 Calif
OBROUND—Crouse-Hinds Co
OBSERVER—Blonder-Tongue Laboratories Inc
OCCO—Tocco Div Ohio Crankshaft Co
OCT-O-DUCT—Soapstone Duct Co
OCTA-TUBE—Millerbernd Mfg Co
OCULITE—Burton Mfg Co
ODOR-MASTER—Edco International Corp
ODOROUT—Westinghouse Electric Corp Lamp Div Ohio Brass Co 380 N Main St Mansfield Ohio
Ohio Carbon Co 12508 Berea Rd Cleveland 11 Ohio
OHIOHM—Ohio Carbon Co
OHM-SPUN—States Co
Ohmite Mfg Co 3601 Howard St Skokie Ill
OHMOID—Wilmington Fibre Specialty Co
OHMSTONE—Johns-Manville
OILIFTER—Controls Co of America
OILITE—Amplex Div Chrysler Corp
OKLIP—Burndy Corp
OKOCORD—Okonite Co
OKOLENE—Okonite Co
OKOLITE—Okonite Co
Okonite Co Passaic NJ
Okonite-Callender Cable Co—see Okonite Co
OKOPRENE—Okonite Co
OKOSEAL—Okonite Co
OKOTHERM—Okonite Co
OKOVAR—Okonite Co
Okun (A L) Co Inc 109-02 Van Wyck Expressway South Ozone Park NY
Oliver Electrical Mfg Co P O Box 217 Battle Creek Mich
Oliver Iron & Steel Corp—see Oliver Electrical Mfg Co
OLYMPIC—Lint (Clyde W)
OLYMPIC—Sun-Lite Mfg Co
Olympic Instruments Inc Vashon Wash
Omark Industries Inc 9701 S E McLoughlin Blvd Portland 22 Ore
OMEGA—Wakefield Co
OMEGA-RAY—Luxor Lighting Products Inc
OMNI-GLOW—Industrial Devices Inc
Onan (D W) & Sons Inc 2515 University Ave S E Minneapolis 14 Minn
ONE-COTE—Eagle-Picher Co
ONE-PIECE—Buchanan Electrical Products Corp
ONE SHOT—Hein-Warner Corp
1000 LINE—Wakefield Co
ONE TIME—Ware Fuse Corp
O'Neil-Irwin Mfg Co 427 Eighth Ave Lake City Minn
ONEPACK—Electric Products Co
ONLI—Perfeclite Co
Opad Electric Co 43 Walker St New York 13 NY
OPALITE—Lightolier Inc
OPALUX—Lightolier Inc
OPTIPLEX—Lightolier Inc
OPTOMATIC—Trico Fuse Mfg Co
Orangeburg Mfg Co 375 Park Ave New York 22 NY
ORBLITE—Steber Mfg Co
ORGANO-FLUX—London Chemical Co Inc
ORGOBLOS—Spencer Turbine Co
ORTHO—Gibson Mfg Co
ORTHONULL—General Radio Co
ORTO—Line Material Industries
Osoco Mfg Co P O Box 7268 Ft Worth Tex
Oster Mfg Co 1340 E 289 St Wickliffe Ohio
OVALIT—Kliegl Bros
OVALITE—Line Material Industries
OVALTUBE—Plastoid Corp
Overbagh & Ayres Mfg Co 411 S Clinton St Chicago 7 Ill
Overly-Hautz Co 11500 Madison Ave Cleveland 2 Ohio
Oviatt (D C) Co 2174 Lakeside Ave Cleveland 14 Ohio
Owatonna Tool Co 178 N Cedar St Owatonna Minn
Owens Illinois Glass Co—see Kimble Glass Co
Oxford Electric Corp Hudson Lamp Div—see Hudson Lamp Co
OXOFF—Anaconda Wire & Cable Co
Oxwall Tool Co Ltd 928 Broadway New York 10 NY
OZITE—G & W Electric Specialty Co

P

PAD Inc—see Producers & Distributors Inc
P-A-X—Automatic Electric Co
P & C Hand Forged Tool Co—see P & C Tool Co
P & C Tool Co Box 5926 Milwaukee P O Portland 22 Ore
PD-X—Phelps Dodge Copper Products Corp
PIC—General Controls Co
PIV—Link-Belt Co
P & K—Pfaff & Kendall
PLM Products Inc 3871 W 150 St Cleveland 11 Ohio
P-N—Pyle-National Co
P & P—Potter & Brumfield Div
PQ—Pekcu Co
PR—Plymouth Rubber Co Inc
P & R—Potter & Rayfield Inc
P & S—Pass & Seymour Inc
PTC—Precision Transformer Corp
PUC—Royal Electric Corp
P-W Industries Inc 11200 Roosevelt Blvd Philadelphia 15 Pa
P & W Co—see Partrick & Wilkins Co
PWC—Plastic Wire & Cable Corp
PACEMAKER—Hubbell (Harvey) Inc
PACEMAKER—Lightolier Inc
PACEMAKER—Wakefield Co
Pacific Electric Mfg Co—see Federal Pacific Electric Co
PACKAGE-AIRE—United States Air Conditioning Corp
Page Steel & Wire Div American Chain & Cable Co Inc P O Box 692 Monessen Pa
PAGEPHONE—Femco Inc
PAGESAVER—Auth Electric Co Inc
Paine Co Fullerton Ave & Westgate Rd Addison Ill
PAK-IT—American Pulley Co
Palco Mfg Co 1260 Pennsylvania Ave San Francisco 7 Calif
Paley Mfg Corp—see Circle Air Industries Inc
Palmer Electric & Mfg Co 24 Water St Wakefield Mass
PAN-L-HEAT—Jensen Inc
Panalarm Div Panellit Inc 7401 N Hamlin Ave Skokie Ill
PANASCAN—Panellit Div Information Systems Inc
PANASTAT—Panellit Div Information Systems Inc
PANCAKE—Wiremold Co
PANEL-LUMINOUS—Luminous Ceilings Inc
PANELAIRE—Lighting Products Inc
Panellit Div Information Systems Inc 7401 N Hamlin Ave Skokie Ill
PANELSCOPE—Waterman Products Co Inc
PANELUX—Lighting Products Inc
Panelyte Div St Regis Paper Co Enterprise Ave Trenton NJ
PANG—Automatic Vulcanizers Corp
PANTRO—Control Panel Corp
PAR-BEAM-LITE—Swivelier Co Inc
PARA-HEAT—Essex Wire Corp
PARACORE—Kaiser Aluminum & Chemical Sales Inc
PARADOME—Holophane Co Inc
PARAFLO—Day-Brite Lighting Inc
Paragon Electric Co 1600 12th St Two Rivers Wis
PARAGRID-TILE—Wilson (J A) Lighting & Display Inc
PARAGROOVE—Line Material Industries
PARALOUVER—Day-Brite Lighting Inc
PARAMOUNT—Earl Electric Mfg Corp
PARAMOUNT—Haartz-Mason Inc
Paramount Industries Inc G-1080 Ballanger Rd Flint 4 Mich
PARANITE—Essex Wire Corp
PARAPLASTIC—Haartz-Mason Inc
Parco Mfg Co—see Rogers Electric Laboratories Inc
Park Metalware Co Inc—see Xcelite Inc
Park Nameplate Co Inc 34-10 Linden Place Flushing NY
Parker Electrical Mfg Co 221 Washington St Oakland 7 Calif
PARQUAY—Brown Co
Parr Electric Co—see Parr Mfg Co
Parr Mfg Corp 44 Austin St Newark 2 NJ
Partlow Corp 230 Campion Rd New Hartford NY
Partrick Carter & Wilkins Co—see Partrick & Wilkins Co
Partrick & Wilkins Co 51 N Seventh St Phila 6 Pa
Pass & Seymour Inc Syracuse 9 NY
PASSMOUR—Pass & Seymour Inc
PATENT-FLEX—Wil-Son Mfg Co
Patent Scaffolding Co Inc 38-21 12th St Long Island City 1 NY
PATH FINDER—Cannon Electric Co
PATH OF LIGHT—Touch-Plate Mfg Corp
PATHFINDER—York Div Borg-Warner Corp
PATTERN-LITE—Keystone Electric Mfg Co
Pattern Products Co P O Box 135 Union NJ
PEAK DRILL—Star Expansion
Peck Stow & Wilcox Co 274 Center St Southington Conn
Pedrick Tool & Machine Co 3640 N Lawrence St Phila 40 Pa
PEDRIMATIC—Pedrick Tool & Machine Co
PEE-WEE—Mueller Electric Co
PEEP SPOT—Neo-Ray Products Inc
Peer Inc 1220 Milton St Benton Harbor Mich
PEERLESS—General Cable Corp
Peerless Electric Co—see Peerless Electric Div H K Porter Co Inc
Peerless Electric Div H K Porter Co Inc 1401 W Market St Warren Ohio
Peerless Mfg Co—see Valley Fan Mfg Co
PEERLITE—Guth (Edwin F) Co
PEGI—Adalet Mfg Co
Pekcu Co 1227 McDonald Ave Brooklyn 30 NY
PEMCO—Parker Electrical Mfg Co
PEMCO—Philadelphia Electrical & Mfg Co
PEN RAY—Ultra-Violet Products Inc
PENCIL OF LIGHT—Electronic Control Corp
Penco Div Alan Wood Steel Co 200 Brower Ave Oaks Pa
PENDLUM—Versen (Kurt) Co
PENDOME—Versen (Kurt) Co
Penetone Co 74 Hudson Ave Tenafly NJ
Penetray Corp 615 Front St Toledo 5 Ohio
PENETROX—Burndy Corp
PENN—Solar Electric Corp
Penn Controls Inc Goshen Ind
PENN-CRIMPS—Penn-Union Electric Corp
Penn Electric Switch Co—see Penn Controls Inc
Penn Fibre & Specialty Co Inc 2024 E Westmoreland St Phila 34 Pa
Penn (Wm) Fluorescent Light Mfg Co 1228 N 31 St Philadelphia 21 Pa
PENN LITE—Penn (Wm) Fluorescent Light Mfg Co
PENN-ONS—Penn-Union Electric Corp
PENN-SLEEVES—Penn-Union Electric Corp
PENN-STEMS—Penn-Union Electric Corp
PENN-TAPS—Penn-Union Electric Corp
Penn-Union Electric Corp 315 State St Erie Pa
PENN-WRAPPER—Penn-Union Electric Corp
PENNDRILL—Pennsylvania Drilling Co
PENNLUGS—Penn-Union Electric Corp
PENNSBURG—Penn (Wm) Fluorescent Light Mfg Co
Pennsylvania Drilling Co Masonry Drill Div 1201 Banksville Rd Pittsburgh 16 Pa
Pennsylvania Transformer Co—see Pennsylvania Transformer Div
Pennsylvania Transformer Div McGraw-Edison Co Box 330 Canonsburg Pa
PENOLENE—Penetone Co
PENOTE—Cleveland Trencher Co
PENROSE—Northbrook Products Inc
PERECO—Pereny Equipment Co
Pereny Equipment Co 893 Chambers Rd (Station A Box 8153) Columbus Ohio
Pereny Pottery & Equipment Co—see Pereny Equipment Co
PERFALUX—Lightolier Inc
Perfeclite Co 1457 E 40 St Cleveland 3 Ohio
Perfect-Line Mfg Corp Old Country Rd & Railroad Ave P O Box 65 Hicksville L I NY
PERFECTAIRE—Perfect-Line Mfg Corp
Perfection Industries Div Hupp Corp 1135 Ivanhoe Rd Cleveland 10 Ohio
Perfex Controls—see General Controls Co
Performance Measurements Co 15301 W McNichols Detroit 35 Mich
PERM-ALIGN—Cummins Portable Tool Div John Oster Mfg Co

PERMA-CHARGER—Jordan Electric Products Div Electric Storage Battery Co
PERMA-CODE—Brady (W H) Co
Perma-Pipe Corp P O Box 525 Middleboro Ky
Permacel U S Highway 1 New Brunswick NJ
Permacel-Lepage's Inc—see Permacel
PERMAFLECTOR—Pittsburgh Reflector Co
PERMALINE—Line Material Industries
PERMAPRENE—Hatfield Wire & Cable Div Continental Copper & Steel Industries Inc
PERMASEAL—Guardian Mfg Co
PERMI-CAL—Topflight Corp
Peschel Electronics Inc RFD #1 Patterson NY
Peters Mfg Co 162 Old Colony Ave Wollaston 70 Mass
PETRO-DURE—Phelps Dodge Copper Products Corp
Petter Diesel Engine Div Brush Aboe Inc 34-14 58th St Woodside 77 NY
PEXTO—Peck Stow & Wilcox Co
Pfaff & Kendall 84 Foundry St Newark 5 NJ
Phalo Plastics Corp 530 Boston Turnpike Shrewsbury Mass
PHALON—Phalo Plastics Corp
PHANO-CHARGER—General Electric Co
PHAROS—Perfeclite Co
PHASE-ISOLATED—Pennsylvania Transformer Div
PHASE-GUARD—Stradley Engineering Co
PHASEFORMER—Eastern Specialty Co
PHAZGARD—Chronoflash Co
Phelps Dodge Copper Products Corp 300 Park Ave New York 22 NY
Phelps Fan Mfg 715 Thomas St Little Rock Ark
Phelps Mfg Co—see Phelps Fan Mfg Co
PHIL-TROL—Phillips Control Corp
Philadelphia Electrical & Mfg Co 1200-36 N 31 St Phila 21 Pa
PHILITE—Ruby-Philite Corp
Phillips (Oscar) Co 9701 Reading Rd (Box 21) Cincinnati 15 Ohio
Phillips Control Corp 59 W Washington St Joliet Ill
PHOENIX—Commercialaire Corp of America
PHOENIX—Frigid Inc
PHONACALL—Sperti Faraday Inc
PHONETALARM—American District Telegraph Co
PHOSTUBE—All-State Welding Alloys Co Inc
PHOTO-TROLLER—Westinghouse Electric Corp
Photobell Co Inc 43 Vesey St New York 7 NY
Photomation Inc 96 S Washington Ave Bergenfield NJ
PHOTOSWITCH—Electronics Corp of America
PIC—General Controls Co
PICK-OFF—Topflight Corp
PICOMA—Pipe Coupling Mfrs Inc
Pieper-Lillard Div Jasper Blackburn Corp 1525 Woodson Rd St Louis 14 Mo
PIER—Peer Inc
Pierce Renewable Fuses Inc Box F Leicester NY
PIERCEWAY—Massey (A H) Inc
PIGMAY—Capewell Mfg Co
PIN-GRIP—Star Expansion
PINCOR—Pioneer Gen-E-Motor Co
Pines Engineering Co Inc 601 Walnut St Aurora Ill
PINSPOT—Versen (Kurt) Co
PIOLITES—Wilson (J A) Lighting & Display Inc
Pioneer Gen-E-Motor Co 5841 W Dickens Ave Chicago 39 Ill
Pipe Coupling Mfrs Inc P O Box 488 Martins Ferry Ohio
PIPEMASTER—Erie Tool Works
Piqua Machine & Mfg Co 441 S College St Piqua Ohio
PIRAC—Electri-Cord Mfg Co Inc
PISTOL-GRIP—Anderson Electric Corp
Pitman Mfg Co Garner Ave & Duck Rd Grandview Mo
PITT—Thepitt Mfg Co
Pittsburgh Reflector Co Oliver Bldg Mellon Square Pittsburgh 22 Pa
Pittsburgh Standard Conduit Co 61 Bridge St Pittsburgh 23 Pa
PLANETOR—Price & Rutzebeck
PLANPAK—Automatic Control Co
PLANTE—Gould-National Batteries Inc
PLASCENE—Chester Cable Corp
PLAST-O-PRENE—Snyder (M L) & Son Inc
Plaster-Eye Co 2560 Noblestown Rd Pittsburgh 5 Pa
PLASTI-FLEX—Auburn Mfg Co
PLASTI-LUVR—Luminous Ceilings Inc
PLASTIC METAL—Onan (A L) Co Inc
Plastic Wire & Cable Corp E Main St Jewett City Conn
PLASTICLINER—Duro-Test Corp
PLASTICORD—Chester Cable Corp
PLASTICORE—Chester Cable Corp
PLASTICOTE—Chester Cable Co
Plasticraft Inc—see Mastercraft Plastics Co Inc
PLASTILET—Sloane Mfg Co
PLASTILIFE—David's Gloves Inc
Plastiline Inc 2 Intervale St White Plains N Y
PLASTITE—Whitney Blake Co
Plastoid Corp 42-61 24th St LIC 1 NY
PLASTOLIER—Metalcraft Products Co Inc
PLASTONE—Co-operative Utilities Co Inc
PLEXI-TONE—Penn (Wm) Fluorescent Light Mfg Co
PLEXILUX—Sun-Lite Mfg Co
PLEXILITER—Duro-Test Corp
PLEXLUME—Gruber Bros Inc
PLEXOLINE—Day-Brite Lighting Inc
PLI-A-BAND—Memco Engineering & Mfg Co Inc
PLUG-IN—National Elecrtic Div H K Porter Co
PLUG-IN—Square D Co
PLUGMASTER—Sperti Faraday Inc
PLUGMOLD—Wiremold Co
Plummer (Walter A) Co—see Zippertubing Co
PLUS PANEL—General Switch Co
Plymouth Rubber Co Inc 23 Revere St Canton Mass
PNEOLATOR—Mine Safety Appliances Co
PNEU-DRAULIC—Allis-Chalmers Mfg Co
POCKET-SIZE—Champion DeArment Tool Co
POCKETSCOPE—Waterman Products Co Inc
POLE-MASTER—Klein (Mathias) & Sons
POLE STAR—Pennsylvania Transformer Div
Poles Inc E 706 Sprague Ave Spokane 3 Wash
POLICARB—Driver (Wilbur B) Co
Polis Mfg Co—see Bulldog Div Gregory Industries Inc
Pollak (Joseph) Corp 81-95 Freeport St Boston 22 Mass
Pollak Luminescent Corp 732 S Federal St Chicago 5 Ill
POLY-PLATE—Brady (W H) Co
POLY-V—Raybestos-Manhattan Inc
POLYDYNE—General Electric Co Apparatus Sales Div
Polyken Sales Div Kendall Co 309 W Jackson Blvd Chicago 6 Ill
Polymer Corp 2120 Fairmont Ave Reading Pa
Polymer Corp of Pa—see Polymer Corp
POLYPENCO—Polymer Corp
POLYRANGER—Sensitive Research Instrument Corp
Porcelain Products Co 224 N Patterson St Carey Ohio
PORT-A-PHONE—Feiler Engineering & Mfg Co
PORT-O-REEL—Industrial Electrical Works
PORT-O-VENT—Reed Unit-Fans Inc
PORTA-BAND—Porter-Cable Machine Co
PORTA DRIVE—Muncie Gear Works Inc
PORTA-FLEX—Gardner Products Co
PORTA-KALL—Loge (J M) Sound Engineers
Portable Light Co Inc 216 William St NY 38 NY
PORTAIR—Coppus Engineering Corp
PORTALITE—Carpenter Mfg Co
Porter-Cable Machine Co 700 Marcellus St Syracuse 4 NY
Portland-Monson Slate Co 465 Congress St Portland 3 Me
PORTO—Hessel (W F) Co Inc
PORTO-MITE—Beaver Pipe Tools Inc
PORTO SYSTEM—Hessel (W F) Co Inc
Portomag Inc 1521 E Nine Mile Detroit 20 Mich
POSITECT—S & C Electric Co
POSITIVE SEAL—Allis-Chalmers Mfg Co
POSITROL—S & C Electric Co
Post Electronic Products 140 Elliott St Beverly Mass
POST-LITE—Great Northern Mfg Corp
POSTLITE—Drake Mfg Co
POSTOP—Holophane Co Inc
POTLOK—General Controls Co
Potter & Brumfield Div American Machine and Foundry Co Princeton Ind
Potter & Brumfield Inc—see Potter & Brumfield Div
Potter & Rayfield Inc P O Box 1042 Atlanta Ga
POW-R-SPADE—Stampings Inc
POWACALL—Edwards Co Inc
Powder Power Tool Co—see Omark Industries Inc
POWDIRON—Bound Brook Oil-Less Bearing Co
POWER-CAPSULE—Bogue Electric Mfg Co
POWER CHARGER—Fox Products Co
POWER CHIEF—Nordberg Mfg Co
POWER KING—Goodall Rubber Co
Power Line Fan Co Plainfield NJ
POWER-LITE—Metalcraft Products Co Inc
POWER-LUME—Wheeler Reflector Co
POWER-O-MATIC—Blue M Electric Co
Power Plants Inc—see Electric Power Plants Corp
POWER STREAK—American Electric Cable Co
POWER-TRAN—Mid-States Welder Mfg Co
POWER VENT—Progress Mfg Co Inc
POWERBEL—Auth Electric Co Inc
POWERCON—Cornell-Dubilier Electric Corp
Powercraft Corp 2215 De Kalb St St Louis 4 Mo
POWERDUCT—Anaconda Wire & Cable Co
Powerdyne Inc 17150 Boones Ferry Rd Oswego Ore
POWEREEL—Industrial Electrical Works
POWERLOID—Guardian Electric Mfg Co
POWERLUME—Solar Light Mfg Co
POWERMASTER—Lewis-Shepard Products Inc
POWERMASTER—Oxwall Tool Co Ltd
POWERPACT—Sperti Faraday Inc
POWERPLUG IN—Adam (Frank) Electric Co
POWERS-AMERICAN—McCabe-Powers Body Co
POWERSHOP—DeWalt Div American Machine & Foundry Co
POWERSTAT—Mercoid Corp
POWERSTAT—Superior Electric Co
POWERUPTER—Delta-Star Electric Div H K Porter Co Inc
POWR-KORD—Royal Electric Corp
POWR-PAK—Winpower Mfg Co
POWR-RIB—Ohmite Mfg Co
POWR-STYLE—Square D Co
Powrex Switch Co 36 Pleasant St Watertown Mass
POXALLOY—Okun (A L) Co Inc
PRAYER LIGHT—Aerolux Lights Corp
PRE-MARX—Premax Products Div Chisholm-Ryder Co Inc
PRECIPTRON—Westinghouse Electric Corp Sturtevant Div
PRECISION-CHARGE—Lincoln Electric Co
Precision Thermometer & Instrument Co 1434 Brandywine St Philadelphia 30 Pa
Precision Transformer Corp 2218 West Lake St Chicago 12 Ill
Precision Welder Mfg Co 2218 W Lake St Chicago 12 Ill
PREENX—General Electric Co
Preformed Line Products Co 5349 St Clair Ave Cleveland 3 Ohio
Premax Products Div Chisholm-Ryder Co Inc College & Highland Aves Niagara Falls NY
Prepo Corp Edgerton Wis
PRES-TO-HEAT—Triton Mfg Co Inc
Prescolite Mfg Corp 2229 Fourth St Berkeley 10 Calif
PRESIDENTIAL—Pittsburgh Reflector Co
PRESS LITES—Sun-Lite Mfg Co
PRESSURE-LOCK—General Electric Co
Pressure Products Corp—see Prepo Corp
PRESSWITCH—Hubbell (Harvey) Inc
PRESTEST—Cutler-Hammer Inc
PRESTO—Bogen-Presto Co
Presto Recording Corp—see Bogen-Presto Co
PREXLITE—Gruber Bros Inc
PRIBRO—Price Bros Inc
Price Bros Inc 4301 W Madison St Chicago 24 Ill
Price Electric Corp East Church & Second Sts Frederick Md
Price & Rutzebeck P O Box 30 Hayward Calif
PRINCESS—Curtis Lighting Div
Principle Research & Development Corp 200 Citizens Bldg Aberdeen SD
PRINCO—Precision Thermometer & Instrument Co
Pringle Electrical Mfg Co 1900-1912 N Sixth St Philadelphia 22 Pa
PRISMACITE—Keystone Electric Mfg Co
PRISMALUX—Lightolier Inc
PRISMOID—Guth (Edwin F) Co
PRODUCERLITE—Solar Light Mfg Co
Producers and Distributors Inc 1321 Hanover Ave Allentown Pa
PRODUCTIMETER—Durant Mfg Co
Production Planning Co—see Allen Cooler & Ventilator Inc
PROFILE—Lightolier Inc
PROGRAMONITOR—Counter & Control Corp
Progress Mfg Co Inc Castor Ave & Tulip St Phila 34 Pa
Project Fixture Mfg Corp 55 Ongley St Rockville Centre NY
PROJECTORAMA—Century Lighting Inc
PROMATIC—General Control Co
PROPELLAIR—Robbins & Myers Inc
PROTECT-A-PHONE—Simpson (Mark) Mfg Co Inc
PROTECT-O-VANE—Minneapolis-Honeywell Regulator Co Industrial Div
Protection Controls Inc 6000 N Legett Ave Chicago 46 Ill
PROTECTO-MASK—Mystik Adhesive Products Inc
PROTECTOGLO—Minneapolis-Honeywell Regulator Co Industrial Div
PROTECTROL—Automatic Control Co
PROTEX—Woodhead (Daniel) Co
PROTEXTUBE—Eagle Electric Mfg Co Inc
PRY-LITE—Emerson-Pryne Co
Pucel Enterprises Inc 3746 Kelley Ave Cleveland 14 Ohio
PUL-LIFT—Yale & Towne Mfg Co
PULFLEX—Universal Metal Hose Co
PULFUZSWITCH—Adam (Frank) Electric Co
PULL-A-WAY—Wright Hoist Div
PULL-REEL—Narragansett Wire Co
Pullman Vacuum Cleaner Corp 25 Buick St Boston 15 Mass
PULSECOPE—Waterman Products Co Inc
PULSOLITE—Electronic Control Corp
PUMPTROL—Square D Co
PUNCHY—Curtis Lighting Div Curtis-All Brite Lighting Inc
PUR-AR-LITE—House-O-Lite Corp
Pure Carbon Co Inc 441 Hall Ave St Marys Pa
PUREBON—Pure Carbon Co Inc
PUREMET—Pure Carbon Co Inc
PURMA-DURE—Phelps Dodge Products Corp
PUSHBUTTON—White-Rodgers Co
PUSHMATIC—BullDog Electric Products Div
Pyle-National Co 1344 N Kostner Ave Chicago 51 Ill
PYLE-O-FLEX—Pyle-National Co
PYLE-STAR—Pyle-National Co
PYLETS—Pyle-National Co
PYLON-LITE—Revere Electric Mfg Co
PYR-O-VANE—Minneapolis-Honeywell Regulator Co Industrial Div
PYRALITE—Gruber Bros Inc
Pyramid Electric Co 1445 Hudson Blvd North Bergen NJ
Pyramid Instrument Corp 630 Merrick Rd Lynbrook NY
PYRANOL—General Electric Co
PYRATHERM—Mercoid Corp
PYREX—Corning Glass Works
PYRO—Pyrometer Instrument Co
PYRO TEMP—Electronic Control Corp
PYROCAST—Pyrosil Inc
PYROCON—Illinois Testing Laboratories Inc
Pyrometer Instrument Co Bergenfield NJ
Pyrosil Inc 1889 Front St Cuyahoga Falls Ohio
PYROVENT—Bertram (Harvey P) Co

Q

Q-BESTON—Auburn Mfg Co
QIKTAP—Burndy Corp
QUAD—Quadrangle Mfg Co
Quadrangle Mfg Co 32 S Peoria St Chicago 7 Ill
QUADRILITE—Lightolier Inc
QUAKER—Lukens (Thos F) Metal Co
QUAKER—Snyder (M L) & Son Inc
Quaker City Electric Mfg Co 2810 E Pacific St Phila 34 Pa
QUAKER LITE—Quaker City Electric Mfg Co
Quartz Products Corp 688 Somerset St (P O Box 628) Plainfield NJ
Queen Gray Co—see Gray Instrument Co
Queen Products Co Inc Thirteenth & Rowan Sts Louisville 3 Ky
QUELARC—Pyle-National Co

QUICK-BILT—Frick-Gallagher Mfg Co
Quick Charge Inc—see Quick Charge Division Line Scale Company Inc
Quick Charge Div Line Scale Co Inc 3737 N W 37th Oklahoma City Okla
QUICK-CLEAN—Allis-Chalmers Mfg Co
QUICK-DRIVE—Omark Industries Inc
QUICK-TROL—Nelson Electric Mfg Co
QUICK-WEDGE—Kedman Co
QUICKSTART—Marvel Lamp Co
QUICKWIRE—Cable Electric Products Inc
QUICKWIRE—Leviton Mfg Co Inc
QUIET—Kent Co Inc
QUIET AC—Leviton Mfg Co Inc
QUIET—Sierra Electric Corp
Quiet Heet Mfg Corp 46 Oliver St Newark 5 NJ
QUIET KOOL—Quiet-Heet Mfg Corp
QUIET-LIGHT—Metalcraft Products Co Inc
Quigley Co Inc 415 Madison Ave New York 17 NY
Quijada Tool Co Inc—see Collins Machinery Corp
Quijada Tool Div—see Collins Machinery Corp
QUIK-HEAT—Clements Mfg Co
QUIK-LABEL—Brady (W H) Co
QUIK-LIFT—Coffing Hoist Div Duff-Norton Co
QUIK-LOC—Joy Mfg Co
QUIK-LOK—Eagle Electric Mfg Co Inc
QUIK-PLATE—Brady (W H) Co
QUIK-VAC—Clements Mfg Co
QUIKHETER—Adam (Frank) Electric Co
QUIKIT—Wells Mfg Corp
QUIKLUG—Burndy Corp
QUIKSITE—H-B Instrument Co
Quincy Elevator Gate Co—see Quincy Mfg Co
Quincy Mfg Co Box 916 Tiffin Ohio
QUINORGO—Johns-Manville
QUINTERRA—Johns-Manville
QUINTERRABORD—Johns-Manville
QWIK-CHANGE—Square D Co
QWIK-OPEN—Square D Co

R

R-ASE—All-Steel Equipment Inc
RABC—Reynolds Metals Co
R-B-M Controls Div Essex Wire Corp 131 Godfrey St Logansport Ind
RCA—Radio Corp of America
RCD—Rotary Concrete Drill Co
RCS Tool Corp 227 E Front St (PO Box 661) Bloomington Ill
RCS Tool Sales Corp—see RCS Tool Corp
RE—Reuland Electric Co
R & IE Equipment Div—see I-T-E Circuit Breaker Co
R-K—Ruggles-Klingemann Mfg Co
R/M—Raybestos-Manhattan Inc
R & M—Robbins & Myers Inc
R & M Hunter—see Hunter Div
RS—River Smelting & Refining Co
R/S—Refrigerating Specialties Co
R T & E Co—See R T & E Corp
R T & E Corp 1900 East North St Waukesha Wis
Rab Electric Mfg Co Inc 605 E 132 St New York 54 NY
RECAL—Versen (Kurt) Co
RABOLITE—Rab Electric Mfg Co Inc
Racine Electric Products—see Howard Industries Inc
RACO—All-Steel Equipment Inc
RADARANGE—Raytheon Mfg Co
RADCOR—Wiegand (Edwin L) Co
RADECTOR—Jordan Electronics
RADI-AIRE—Reynolds Electric Co
Radiant Lamp Corp 300 Jelliff Ave Newark 8 NJ
RADIANTGLASS—Allied Precision Industries
RADIASTAT—Ward Leonard Electric Co
Radio Corp of America Industrial Electronics Products Front & Cooper Sts Camden 2 NJ
Radio Frequency Laboratories Inc Boonton NJ
Radio Receptor Co Inc 240 Wythe Ave Brooklyn 11 NY
RADIOCARB—Driver (Wilbur B) Co
Radionic Transformer Co 411 S Sangamon St Chicago 7 Ill
RADIX—Versen (Kurt) Co
Radix Wire Co 26260 Lakeland Blvd Cleveland 32 Ohio
RADOR—Atlas Overhead Door Co
Rae Motor Corp 2009 Kewaunee St Racine Wis
RAKIT—Cope (T J) Div Rome Cable Corp
RAKSCOPE—Waterman Products Co Inc
Raico Mfg Co 123-141 N Albany Ave Chicago 12 Ill
RAM—Diamond Expansion Bolt Co Inc
RAMAC—Rattan Mfg Co
Rambusch Decorating Co 40 W 13 St New York 11 NY
Ramco Mfg Co 540 Westfield Ave W Roselle Park NJ
Ramco Mfg & Engineering 5413 N E Columbia Blvd Portland Ore
Ramset Div—see Ramset Fastening System
Ramset Fastening System Winchester-Western Div Olin Mathieson Chemical Corp 289 Winchester Ave New Haven 4 Conn
Ramset Fasteners Inc—see Ramset Fastening System
RANCH-AIRE—Cool-ette Inc
RANCH-VENT—Cool-ette Inc
RANCHO—Western Insulated Wire Co
RANCHOPRENE—Western Insulated Wire Co
Randall Graphite Bearings Inc Greenlawn & Lake Sts Lima Ohio
RANGE LUGS—Frankel Connector Co
RANGER—Day-Brite Lighting Inc
RANGESPLICES—Frankel Connector Co
RANGESTUD—Frankel Connector Co
RANGETAP—Frankel Connector Co
Rapid Electric Co Inc 2881 Middletown Rd Bronx 61 NY
Rapid Electroplating Process Inc 1414 S Wabash Ave Chicago 5 Ill
RATOLARM—Fischer & Porter Co
RATTAN—Benjamin Electric Mfg Co
Rattan Mfg Co 10 Wall St (P O Box 1745) New Haven 7 Conn
Rattray (George) & Co 116-08 Myrtle Ave Richmond Hills 18 NY
Rauland-Borg Corp 3535 West Addison St Chicago 18 Ill
RAWL—Rawlplug Co Inc
RAWLDRILL—Rawlplug Co Inc
RAWLDRIVE—Rawlplug Co Inc
Rawlplug Co Inc 212 Petersville Rd New Rochelle NY
RAY-LINE—Portable Light Co Inc
RAY-LINE—Sireno Co Inc
RAY MAN—Raybestos-Manhattan Inc
RAY-O-CELL—Com-Pak-Ett Mfg Corp
RAY-VEC—Electrend Products Corp
Raybestos-Manhattan Inc 61 Willett St Passaic NJ
Raydyne Corp 2715 S Fourth St (P O Box 1147) Springfield Ill
RAYESCENT—Westinghouse Electric Corp Lamp Div
Raytheon Mfg Co Commercial Apparatus & Systems Div 100 River St Waltham 54 Mass
RE-CIRK-IT—Heinemann Electric Co
RELON—Versen (Kurt) Co
RE LUX—Versen (Kurt) Co
REACTODYNE—U S Electrical Motors Inc
REACTROL—General Electric Co
Reading Chain & Block Corp—see Reading Crane & Hoist Corp
Reading Crane & Hoist Corp 2100 Adams St Reading Pa
Ready-Power Co 11231 Freud Ave Detroit 14 Mich
REAIRE—Versen (Kurt) Co
REALITE—Holophane Co Inc
REAM-RITE—Holub Industries Inc
RECO—Reynolds Electric Co
Recora Co Inc Powis Rd (Box 68) St Charles Ill
RECTI-FILTER—Raytheon Mfg Co
RECTICHARGER—Raytheon Mfg Co
RECTIRINGER—Raytheon Mfg Co
RECTODYNE—Christie Electric Corp
RECTOPOWER—Mallory (P R) & Co Inc
RECTOX—Westinghouse Electric Corp
RED ARROW—Lift Trucks Inc
RED BAND—Howell Electric Motors Co
RED CENTER—Klein (Mathias) & Sons
RED "D"—Diamond Wire & Cable Co
RED-D-HEAT—Diamond Wire & Cable Corp
RED-D-PRENE—Diamond Wire & Cable Co
RED DOT—Mason (L E) Co
RED GIANT—Revolvator Co
RED HEAD—Blaco Mfg Co
RED-LUX—Duro-Test Corp
Red Seal Electric Co 10307 Detroit Ave Cleveland 2 Ohio
RED TOP—H B Instrument Co
Redi-Bolt Inc 5334 Indianapolis Blvd East Chicago Ind
REDI-FAB—Barber-Greene Co
REDI-FLOW—Barber-Greene Co
REDI-HEAT—Knapp-Monarch Co
REDI-RODS—Redi-Bolt Inc
Redmond Co Inc 201 Monroe St Owosso Mich
REDOME—Versen (Kurt) Co
REDTOP—Bradley Semiconductor Corp
REDUCO—Versen (Kurt) Co
Reed Unit-Fans Inc 501 N St Patrick St New Orleans La
REEL-O-MATIC—Columbia Products Inc
REELIFT—Hykon Mfg Co
REELITE—Appleton Electric Co
Reeve Electrical Co Inc 120 W 42nd St New York 36 NY
Reeve Electronics Inc 609 W Lake St Chicago 6 Ill
REEVELEC—Reeve Electronics Inc
Reeves Pulley Co 1225 7th St Columbus Ind
REFLEX—Versen (Kurt) Co
REFRACTOLENS—Holophane Co Inc
Refrigerating Specialties Co 3004 W Lexington St Chicago 12 Ill
REGAL-LITE—Sterner Industries
REGATRON—Electronic Measurements Co Inc
REGENT—Keystone Electric Mfg Co
REGOHM—Electric Regulator Corp
REGULA—Curtis Lighting Div Curtis-All Brite
REGULEX—Allis-Chalmers Mfg Co
REGULITE—Ward Leonard Electric Co
REGUTRON—Electric Machinery Mfg Co
Reichert Float and Mfg Co 2242 Smead Ave Toledo 6 Ohio
REIGNSEAL—Peters Mfg Co
REIGNSKIN—Peters Mfg Co
REJUST—Versen (Kurt) Co
RELAY-AMP—Goldak Co Inc
RELECTO—Appleton Electric Co
RELENS—Versen (Kurt) Co
RELIABLE—Standard Electric Co Inc
Reliable Battery Co—see Standard Electric Co Inc
RELIANCE—American Steel & Wire Div
RELIANCE—Trine Mfg Corp
Reliance Automatic Lighting Co 1927 Mead St Racine Wis
Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland 17 Ohio
RELOID—Guardian Electric Mfg Co
Relton Corp 99 N Lotus Ave (P O Box 5546) Pasadena Calif
REMCON—Pyramid Instrument Corp
Remington Corp Remington Air Conditioning Div Willey St Auburn NY
Remington Arms Co Inc 939 Barnum Ave Bridgeport 2 Conn
REMOTROL—Midwest Electric Products Inc
REMOTROL—Templeton Kenly & Co
RENAISSANCE—Globe Lighting Products Inc
REPAR—Versen (Kurt) Co
Republic Creosoting Co 1615 Merchants Bank Bldg Indianapolis 4 Ind
Republic Steel Corp Steel And Tubes Div 224 E 131 St Cleveland 8 Ohio
RESISTOL—Collyer Insulated Wire Co
RESISTOYL—G & W Electric Specialty Co
RESPOT—Versen (Kurt) Co
RETRACT-O-REEL—Appleton Electric Co
Reuland Electric Co 3001 W Mission Rd Alhambra Calif
Revere Copper & Brass Inc 230 Park Ave NY 17 NY
Revere Electric Mfg Co 7420 N Lehigh Ave Chicago 48 Ill
REVMASTER—Opad Electric Co
Revolvator Co 2000 86th St North Bergen NJ
REVOLVO—Frick-Gallagher Mfg Co
REVOLVO RAY—Sireno Co Inc
REVOTROL—Acme Electric Corp
REVUE—Versen (Kurt) Co
REX—Air Controls Inc
REX—Chain Belt Co
REX—Peer Inc
REX-AIRATE—Air Controls Inc
Rex Metal Craft Inc 1717 Gent St Indianapolis 2 Ind
REX-TUBE—Flexonics Corp
Rex Welder Co 1200 Milton St Benton Harbor Mich
Rex Welder Sale Co—see Universal Electric Sales Corp
REXSELEN—Knopp Inc
Reynolds Electric Co 3000 River Rd River Grove Ill
Reynolds Metals Co Richmond 18 Va
Rhode Island Insulated Wire Co Inc 50 Burnham Ave Cranston RI
Rhodes (M H) Inc 30 Bartholomew Ave Hartford 6 Conn
Rich (Phil) Fan Mfg Co Inc 2900 Caroline Houston 4 Texas
Rich Lamp Mfg Co—see Stabrite Fluorescent Mfg Co
Richards (J R) Co P O Box 482 Carnegie Pa
Richards Mfg Co Ltd 25 Rankin St Newark 3 NJ
Richards-Wilcox Mfg Co 150 Third St Aurora Ill
Richardson-Allen Corp 116-15 Fifteenth Ave College Point LI NY
RICHMOND—Miller Co
Ridge Tool Co 400 Clark St Elyria Ohio
RIDGID—Ridge Tool Co
RIDGOILR—Ridge Tool Co
Rieber (Frank) Inc—see Caltron Products Co
RIMSET—Penn Controls Inc
RINGCALL—Edwards Co Inc
Ringsdorff Carbon Corp Box 22 East McKeesport Pa
RIPFLEX—Hatfield Wire & Cable Div
Ripley Co Inc Factory St Middletown Conn
RISERTHERM—Mercoid Corp
RITEOHM—Ohmite Mfg Co
RITEWAY—Building Service Co
Rittenhouse Co Inc East St Honeoye Falls NY
River Smelting & Refining Co 4195 Bradley Rd (P O Box 5755) Cleveland 1 Ohio
Riverside Mfg & Electrical Supply Co 10228 Michigan Ave Dearborn Mich
RO-TITE—Curtis Lighting Div
Robbins & Myers Inc 1345 Lagonda Ave Springfield Ohio
Robbins & Myers Inc Fan Div—see Hunter Div
Roberson Inc 1539 E 103 St Seattle 55 Wash
Roberson (L N) Co—see Roberson Inc
ROBERTA—House-O-Lite Corp
Robertson & Ruth 460 W Lake St Elmhurst Ill
Robertson Transformer Co Thornton Road Blue Island Ill
ROBINTRONIC—Hewitt-Robbins Inc
ROBOT—Miller Harris Instrument Co
Robot Appliances Inc—see Robot Industries Inc
ROBOT-EYE—Heat Timer Corp
Robot Industries Inc 7041 Orchard St Dearborn Mich
ROBOTROL—Reliance Automatic Lighting Co
Robotron Corp 21300 W Eight Mile Rd Detroit 19 Mich
ROCK BRAND—Weiss Biheller Merchandise Corp
Rockbestos Products Corp—see Rockbestos Wire & Cable Co
Rockbestos Wire & Cable Co Nicoll and Canner Sts New Haven 4 Conn
ROCKER-GLO—Pass & Seymour Inc
ROCKET—Round (David) & Son Inc
Rocket Devices Corp—see Star Expansion
ROCKING CONTACT—Allis-Chalmers Mfg Co
Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa
RODAR—Driver (Wilbur B) Co
ROE PLASTIC—Roebling's (John A) Sons Corp
Roebling's (John A) Sons Corp 640 S Broad St Trenton 2 NJ
ROEBX—Roebling's (John A) Sons Corp
ROECLAD—Roebling's (John A) Sons Corp
ROECLAMP—Roebling's (John A) Sons Corp
ROECORD—Roebling's (John A) Sons Corp
ROECOZONE—Roebling's (John A) Sons Corp
ROEGLAS—Roebling's (John A) Sons Corp
ROEPRENE—Roebling's (John A) Sons Corp
ROESHEATH—Roebling's (John A) Sons Corp
ROETEMP—Roebling's (John A) Sons Corp

ROEVAR—Roebling's (John A) Sons Corp
ROEWELD—Roebling's (John A) Sons Corp
ROFLEX—Rome Cable Corp
Rogers Electric Laboratories Inc 2651 Shaker Rd Cleveland Hts 18 Ohio
Rol-Away Truck Co—see Rol-Away Truck Mfg Co Inc
Rol-Away Truck Mfg Co Inc 6143 S E Foster Rd Portland 6 Ore
ROL-TOE—Templeton Kenly Co
ROLARC—Federal Pacific Electric Co
ROLENE—Rome Cable Corp
Roll-A-Reel Co 4630 Reading Rd Cincinnati 29 Ohio
Roller (Wm G) Inc 159 Liberty Ave Mineola NY
Roller-Smith Corp—see Federal Pacific Electric Co
Roller-Smith Inc—see Federal Pacific Electric Co
Roller-Smith Corp—see Electric Distribution Products Inc
ROLLEREEL—Suttle Equipment Co
ROLLO-COLOR—Luxor Lighting Products Inc
ROLON—Rome Cable Corp
ROMARINE—Rome Cable Corp
Rome Cable Corp—see Rome Cable Div
Rome Cable Div Aluminum Co of America 421 Ridge St Rome NY
ROME-RIGID—Rome Cable Corp
ROMEX—General Cable Corp
ROPRENE—Rome Cable Corp
ROSEAL—Rome Cable Corp
ROSINX—Dunton (MW) Co
Rostan Corp 5660 59th St Maspeth 78 LI NY
ROTABIN—Frick-Gallagher Mfg Co
Rotary Concreate Drill Co 650 S Arroyo Parkway Pasadena 1 Calif
Roth Mfg Co 6420 W Howard St Chicago 31 Ill
Roto-Beam 1755-57 N Keeler Ave Chicago 39 Ill
ROTO-BIN-DICATOR—Bin Dicator Co
ROTO-GLO—Pass Seymour Inc
ROTO-GUARD—Bin-Dicator Co
ROTO-PUSH—Cutler Hammer Inc
ROTO-STACKER—Crane Veyor Corp
ROTO STRIP—Neo-Ray Products Inc
ROTO TORK—Haydon (A W) Co
ROTO TROL—Healy-Ruff Co
ROTOBEAM—General Lighting Co
ROTOLECTOR—Kliegl Bros Universal Electric Stage Lighting Co Inc
ROTOLENS—Steber Mfg Co
ROTOMOTIVE—Jack & Heintz Inc
ROTOSPOT—Rambusch Decorating Co
ROTOTROL—Westinghouse Electric Corp
ROTRTWIST—Star Expansion
Round (David) & Son Inc Box 883 Cleveland 22 Ohio
ROUND WOUND—Line Material Industries
ROV-A-LITE—Terado Co
ROYAL—Waveland Electric Co
Royal Electric Co Inc—see Royal Electric Corp
Royal Electric Corp 95 Grand Ave Pawtucket RI
Royal Electric Mfg Co 1122 E 87 St Chicago 19 Ill
ROYAL-NOARK—Royal Electric Corp
ROYALAG—Royal Electric Co
ROYALMATIC—Standard Electric Time Co
ROZONE—Rome Cable Corp
RUBBER COAT—Wilbur Williams Co
RUBBON SOLDER—All-State Welding Alloys Co Inc
Ruberoid Co 500 Fifth Ave New York 36 NY
RUBRES—Co-operative Utilities Co Inc
RUBRGLAS—Automatic & Precision Mfg Co
RUBRITE—Co-operative Utilities Co Inc
Ruby Chemical Co 68-70 McDowell St (PO Box 1108) Columbus 16 Ohio
Ruby Lighting Corp—see Lighting Dynamics Inc
Ruby-Philite Corp 32-02 Queens Blvd Long Island City 1 NY
RUBYFLUID—Ruby Chemical Co
RUCCO—Ruby Chemical Co
Ruggles-Klingemann Mfg Co Foster Court Salem Mass
RUNABOUT—Barber-Greene Co
RUPTAIR—Allis-Chalmers Mfg Co
RUPTOR—Allis-Chalmers Mfg Co
RUR-A-LINE—Plastic Wire & Cable Corp
RURALAY—General Cable Corp
Rusgreen Mfg Co 14262 Birwood Ave Detroit 38 Mich
RUSH Wire Stripper Div Eraser Co Inc 1068 S Clinton St Syracuse 4 NY
Russell & Stoll Co Inc 125 Barclay St NY 7 NY
Rust-Oleum Corp 2425 Oakton St Evanston Ill
RUST SHIELD—Wilbur & Williams Co
RUSTBOND—Carboline Co
RUSTICLITE—Gruber Bros Inc
Ryther Purdy Lumber Co Inc 501 Tiffany St New York 59 NY

S

S & C Electric Co 4435 Ravenswood Ave Chicago 40 Ill
SCBCO—Southern Carbon Brush Co Inc
SCP—Superior Carbon Products Co
SCR DIMMER—Kliegl Bros Universal Electric Stage Lighting Co Inc
S I—Superior Insulating Tape Co
SIE—Southwestern Industrial Electronics Co
SKF Industries Inc Front St & Erie Ave Phila 32 Pa
SMC—St Marys Carbon Co
SPCO—Superior Porcelain Co
S & R—Sherman & Reilly Inc
SVEA—Swedish Iron & Steel Corp
S-Y BONDEZE—Phelps Dodge Copper Products Corp
SA-FUSE—Electric Machinery Mfg Co
SABER-TOOTH—Rawlplug Co Inc
SABRE—Miller Co
SAF-FLEX—Starrett (L S) Co
SAF-T-AIR—United Electric Motor Co
SAF-T-ARC—Russell & Stoll Co Inc
SAF-T-LOK—Bell Electric Co
SAFA Alarm Div Inc Fyr-Fyter Co P O Box 1118 Newark NJ
SAFARI—Benjamin Electric Mfg Co
SAFE-FLEX—Starrett (L S) Co
SAFE-T-BEAM—Westinghouse Electric Corp Lamp Div
SAFE-T-CLIP—Industrial Devices Inc
SAFE-T-GLOW—Brach Mfg Co
SAFE-T-KOOL—Active Specialty Co
SAFE-T-SEALS—Misener Mfg Co Inc
SAFE-T-TAP—Keystone Mfg Co
SAFECOTE—National Electric Div—H K Porter Co
SAFECOTE—Roebling's (John A) Sons Corp
SAFETECH—Capewell Mfg Co
Safety Belt-Lacer Co—see Armstrong-Bray & Co
SAFETY-GLO—Rodale Mfg Co Inc
Safety Live Line Tool Co 973 86th Ave Oakland 21 Calif
SAFETY MI—General Cable Corp
SAFETY PULL—Coffing Hoist Div
SAFETY-VALVE—Bussmann Mfg Div
SAFETY YELLOW—Woodhead (Daniel) Co
SAFETYBREAKER—Cutler-Hammer Inc
SAFEWAY—American Pulley Co
SAFEWAY—Safety Live Line Tool Co
SAFEWAY—Woodhead (Daniel) Co
SAFEWAY—Wright Hoist Div
Safeway Heat Elements Inc Middlefield St (P O Box 1109) Middletown Conn
SAFLEX—Square D Co
SAFPATCH—Kliegl Bros
SAFREEN—Ouro-Test Corp
SAFRONT—Square D Co
SAFTEST—Fieron (M M) & Son
SAFWAY-ALDEK—Safway Steel Products Inc
Safway Steel Products Inc 6234 W State St Milwaukee 13 Wis
St. Louis Brass Co—see Guth (Edwin F) Co
St Louis Malleable Casting Co 7701 N Conduit Ave St Louis 15 Mo
St Marys Carbon Co State St St Marys Pa
Sair Corp 9802 Euclid Ave Cleveland 6 Ohio
Salem Tool Co 767 S Ellsworth Ave Salem Ohio
SALI—Adalet Mfg Co
SAMSON—Metalcraft Products Co Inc
SAND-SCOTT—Holub Industries Inc
Sangamo Electric Co 11th & Converse Springfield Ill
Sargent Electric Corp 630 Merrick Rd Lynbrook NY
Sasgen Derrick Co 3101 Grand Ave Chicago Ill
SAT-O-LITE—House-O-Lite Corp
SATELLUME—Ainsworth Lighting Inc
Sauereisen Cements Co 1045 N Canal St Pittsburgh 15 Pa
Save Lamp Corp—see Penetray Corp
SAW-GUN—Mid-States Welder Mfg Co
SAWZALL—Milwaukee Electric Tool Corp
SAXON—Benjamin Electric Mfg Co
Saxonburg Ceramics Inc. PO Box 157 Saxonburg Pa
Saylor Electric Products Corp 277 Pierce St Birmingham Mich
SAYLORDUCT—Saylor Electric Products Corp
Scaico Controls Inc PO Box 41 Delanco NJ
Scam Instrument Corp 1811 W Irving Rd Chicago 13 Ill
Scharff (J H) Inc—see Kidde Ultrasonic & Detection Alarms Inc
Schauer Machine Co—see Schauer Mfg Corp
Schauer Mfg Corp 4500 Alpine Ave Cincinnati 42 Ohio
Schenectady Varnish Co Inc Congress & 9th Sts Schenectady 1 NY
SCHOOLMASTER—Great Northern Mfg Corp
Schweitzer & Conrad Inc—see S & C Electric Co
Sciaky Bros Inc 4915 W 67 St Chicago 38 Ill
Scientific Electric Inc 105-109 Monroe St Garfield NJ
SCINTAGUN—Goldak Co Inc
SCOOT-LITE—Woodward Machine Co
SCOPE—Stromberg Time Corp
SCOTCH—Minnesota Mining & Mfg Co
SCOTCHCAST—Minnesota Mining & Mfg Co
SCOTCHFIL—Minnesota Mining & Mfg Co
SCOTCHKOTE—Minnesota Mining and Mfg Co
SCOTCHLOK—Minnesota Mining & Mfg Co
SCOTCHTITE—Minnesota Mining & Mfg Co
Scott (H H) Inc 111 Powder Mill Rd Maynard Mass
Scott (Hermon Hosmer) Inc—see Scott (H H) Inc
SCOTTY—Shure Mfg Corp
Scranton Aluminum Mfg Co 419 S Wyoming Ave Scranton Pa
Scranton Cellomatic Battery Corp—see Scranton Storage Battery Corp
Scranton Storage Battery Corp Archbald Pa
Scrayco Level Controls—see Scrayco Mfg Co
Scrayco Mfg Co 201 Greene Ave Middlesex NJ
SCRU-ITS—Solar Electric Corp
SCRU-LEADS—Rawlplug Co Inc
SCRU-TITE—Mastercraft Plastics Co Inc
Scruggs (Lloyd) Co—see Howard Industries Inc
SCRUIN—Star Expansion
SCRULUG—Burndy Corp
SCULPTURAMA—Sunbeam Lighting Co
SEA BREEZE—Emerson Electric Mfg Co
Seaboard Products Corp Electric Heating Div 191 Frelinghuysen Ave Newark NJ
Seager Standard Carbon Co 291 Church St New York 13 NY
SEAL THRU—Eliza Metal Products Co
SEALED TIGHT—Royal Electric Corp
SEALFLEX—Universal Metal Hose Co
SEALNUT—Radio Frequency Laboratories Inc
SEALSTIX—Central Scientific Co
SEALTITE—Anaconda Metal Hose Div
SECONEC—Rusgreen Mfg Co
SECOVAR—Sangamo Electric Co
SECURITY—United States Rubber Co
Security Insert Co 1300 Arch St Phila 7 Pa
Security Lightning Rod Co—see Security Mfg & Contracting Co
Security Mfg & Contracting Co 606-612 Pine St Burlington Wis
SECURITYFLEX—Anaconda Wire & Cable Co
SEECO—Southern Electrical Equipment Co
Seeger-Williams Inc 4 Norman St Bridgeport 5 Conn
SEEL SKREWS—Automatic & Precision Mfg Co
SEELBOLT—Automatic & Precision Mfg Co
SEELRIVIT—Automatic & Precision Mfg Co
SEELUX—Guth (Edwin F) Co
Seely Instrument Co Inc 377 Fourth St (P O Box 387) Niagara Falls NY
Segil (L J) Co 2500 W North Ave Chicago 47 Ill
SELCO—Sell (H H) Electric Co
SELCO—Spies Electric Works
SELECT-A-SPEDE—Allis (Louis) Co
SELECT-AMP—Moloney Electric Co
SELECT-O-MATIC—Feiler Engineering & Mfg Co
SELECTROL—Electro Dynamic Div General Dynamics Corp
SELECTRON—Electro Dynamic Div General Dynamics Corp
SELEKTA—Associated American Winding Machines Inc
SELENIBRAKE—American Rectifier Corp
SELENICHARGER—American Rectifier Corp
SELENIFIER—American Rectifier Corp
SELENIVAC—American Rectifier Corp
SELF-CHECKING—Sensitive Research Instrument Corp
Self-Lifting Piano Truck Co 423 N Main St Findlay Ohio
SELFDRIL—Star Expansion
SELFLUBE—Keystone Carbon Co Inc
Sell (H H) Electric Co 3240 Dakota Ave Minneapolis 16 Minn
SELPO—Self-Lifting Piano Truck Co
SENIOR—Linemaster Switch Corp
Sensitive Research Instrument Corp 310 Main St New Rochelle NY
SENTINEL—Ellenco Inc
SENTINEL—Portable Light Co Inc
Sentry-Lite & Battery Div Hobby & Brown Electronic Corp 237 Sunrise Highway Rockville Centre NY
SEPCO—Steel Electric Products Co Inc
SEPRABLE—Appleton Electric Co
SEQUENSTART—Sola Electric Co
Sequoia Process Corp—see Sequoia Wire & Cable
Sequoia Wire & Cable Co 2201 Bay Rd (P O Box 1007) Redwood City Calif
SERV-EN—Kearney (James R) Corp
SERVICE BUGS—Frankel Connector Co
SERVICE LITER—Revere Electric Mfg Co
SERVICE-MASTER—McCabe-Powers Body Co
SERVICESPOOL—Alpha Wire Corp
SERVISAFE—Thompson Electric Co
SERVISLEEV—Hubbard & Co
SERVIT—Burndy Corp
Servospeed Div Electro Devices Inc 4 Godwin Ave Paterson NJ
Seton Name Plate Co Inc 50 Fitch St New Haven 15 Conn
Seyler Mfg Co—see Chance (AB) Co
SHAFTMOUNT—U S Electrical Motors Inc
Shalda Mfg Co Inc 156 W Providencia Ave Burbank Calif
Shallcross Controls Inc 2217-21 N 31 St Milwaukee 8 Wis
Shallcross Mfg Co Preston St Selma NC
SHALLOBEAM—Sunbeam Lighting Co
SHALLORAMA—Sunbeam Lighting Co
SHALLOW-LINE—Benjamin Division Thomas Industries
Shaw-Box Crane & Hoist Div Manning Maxwell & Moore Inc Muskegon Mich
Shaw-Perkins Mfg Co 201 E Carson St Pittsburgh 19 Pa
SHAWMUT—Chase-Shawmut Co
SHEETFLEXTOS—Keasbey & Mattison Co
Shelby Electric Inc East US Highway #421 Shelbyville Ind
Shenango Furnace Co Centrifugally Cast Products Div West Third St Dover Ohio
Shenango Penn Mold Co—see Shenango Furnace Co
Sherman & Co—see American Silver Co Inc
Sherman Industrial Electronics Div of Engineering Design Inc 108 N Gill St State College Pa
Sherman (H B) Mfg Co 22 Barney Battle Creek Mich
Sherman & Reilly Inc 1 Broad St Chattanooga 2 Tenn
SHERARDUCT—National Electric Div
Sherwin-Williams Co 101 Prospect Ave NW Cleveland 1 Ohio
SHIELD-ARC—Lincoln Electric Co
SHIPMASTER—Lewis-Shepard Products Inc
Shock-Rite Electric Fence Co—see Electric Service Systems Inc
SHOCK-STOPS—Connecticut Hard Rubber Co
SHOK-ABSORBER—Royal Electric Corp
SHOK-PRUF—Cable Electric Products Inc
SHOKLESS—Kneisley Electric Co
SHOP-CADDY—Allied Mfg & Sales Co
SHOP KING—Precision Welder Mfg Co
SHOPLIFTER—Economy Engineering Co

SHORTY—Black & Decker Mfg Co
Shox-Stok Inc Wellington Ohio
Shrader (FW) Co 11623 S Broadway Los Angeles 61 Calif
Shreveport Engineering Co—see Bar-Brook Mfg Co Inc
SHUR-CODE—Westline Products Div
SHUR-MOUNT—Swivelier Co Inc
SHURE DRIVE—Ramset Fastening System
Shure Mfg Corp 1601 S Hanley Rd St Louis Mo
SHURE SET—Ramset Fastening System
SHURFLO—Anchor Metal Co Inc
Shurite Meters 130 Wallace St New Haven 8 Conn
SHURLOK—Pass & Seymour Inc
SHUT-O-VENT—Reed Unit-Fans Inc
SHUTLBRAK—Adam (Frank) Electric Co
SIAMESE—Bradley Semiconductor Corp
SIANOR—Pucel Enterprises Inc
SIDALARM—Newark District Telegraph Co
SIDE-O-RAY—Duray Fluorescent Mfg Co
Siebring Mfg Co George Iowa
SIECO—Sherman Industrial Electronics Div
SIEMARC—Southwestern Industrial Electronics Co
Sierra Electric & Mfg Co—see Sierra Electric Corp
Sierra Electric Corp 15100 S Figueroa Gardena Calif
SIERRA-LOK—Sierra Electric Corp
SIERRA-TEX—Sierra Electric Corp
SIERRA-TRIPLEX—Sierra Electric Corp
SIERRALITE—Sierra Electric Corp
SIERRAPLEX—Sierra Electric Corp
SIERRAWARE—Sierra Electric Corp
SIGHTLINE—Sunbeam Lighting Co
SIGHTMASTER—Art Specialty Co
SIGHTMASTER—Flexo International Corp
SIGHTRON—Lightolier Inc
SIGMA—Wakefield Co
SIGNA-GLOW—Industrial Development Labs Inc
Signal Electric Div King-Seeley Corp 1800 13th St Menominee Mich
Signal Electric Mfg Co—Signal Electric Div
Signal Engineering & Mfg Co—see Wheelock Signals Inc
SIGNAL MAT—Partrick & Wilkins Co
Signalite Fuse Co—see Signalite Inc
Signalite Inc 37-41 Neptune Highway Neptune NJ
SIGNALMASTER—Goldak Co Inc
Signet Controls 3205 S E 13th Ave Portland 2 Ore
SIL-A-TRAN—Mid-States Welder Mfg Co
SIL-BES—Electro-Technical Products Div
SILASTIC—Dow Corning Corp
SILCAD—Yardney Electric Corp
SILCOBEST—Silicone Insulation Inc
SILCONIC—Gould-National Batteries Inc
SILENT—Leviton Mfg Co Inc
Silent Hoist & Crane Co 841 63rd St Brooklyn 20 NY
SILENT-KING—Cable Electric Products Inc
SILIC-O-NETIC—Heinemann Electric Co
Silicone Insulation Inc 1383 Seabury Ave Bronx 61 NY
SILICONIC—Willard Storage Battery Div
SILOTEX—Anaconda Wire & Cable Co
SILTUBE—All-State Welding Alloys Co Inc
SILV-A-FLEX—Plastic Wire & Cable Corp
SILVER BEAUTY—Triple-A Specialty Co
SILVER DOT—Silvray Lighting Inc
SILVER KING—Arro Expansion Bolt Co
SILVER KING—General Control Co
SILVER LABEL—Dunton (MW) Co
SILVER SPOT—Silvray Lighting Inc
SILVERCEL—Yardney Electric Corp
SILVERLINE—Thor Power Tool Co
SILVERLINER—Westinghouse Electric Corp
SILVERSLICK—Republic Steel Corp Steel and Tubes Div
Silvey Pipe Bender Co 2215 Brighton Ave Kansas City 27 Mo
Silvray Lighting Inc 100 Main St Bound Brook NJ
SIMCONEX—Simplex Wire & Cable Co
Simes Co Inc 114 15th Ave College Point LI NY
Simmonds Aerocessories Inc Tarrytown NY
Simonds Saw and Steel Co 470 Main St Fitchburg Mass
Simonski (G S) Co—see Lucifer Furnaces Inc
SIMPLEX—Templeton Kenly & Co
SIMPLEX—Weiss & Biheller Merchandise Corp
Simplex Co Inc 1139-41 N MacArthur Blvd Springfield Ill
Simplex Time Recorder Co 24 S Lincoln St Gardner Mass
Simplex Wire & Cable Co 79 Sidney St Cambridge 39 Mass
SIMPLYTROL—Assembly Products Inc
Simpson Co 1470 Doolittle Dr San Leandro Calif
Simpson Electric Co 5200 W. Kinzie St Chicago 44 Ill
Simpson (Mark) Mfg Co Inc 32-28 49th St Long Island City 3 NY
Simpson Screen Co—see Simpson Co
SIOUX—Albertson & Co Inc
SIRENO—Portable Light Co Inc
Sireno Co Inc 214 William St New York 38 NY
SISCO—Swedish Iron & Steel Corp
Sittler Corp 18 N Ada St Chicago 7 Ill
60th ANNIVERSARY—Garcy Lighting Div Garden City Plating Mfg Co
SKANDIA—Eagle Mfg Co
SKEDOODLE—Reynolds Electric Co
Skil Corp 5033 Elston Ave Chicago 30 Ill
SKILDRILL—Shallcross Controls Inc
SKILSAW—Skil Corp
SKILSAW—Shallcross Controls Inc
Skilsaw Inc—see Skil Corp
Skinner Chuck Co Skinner Electric Valve Div 95 Edgewood Ave New Britain Conn
SKIP TOOTH—Nye Tool Co
SKULLGARD—Mine Safety Appliances Co
SKY-BLAST—Robbins & Myers Inc
SKL-LINER—Allied Mfg & Sales Co
SKY/LUX—Curtis Lighting Div Curtis-All Brite
SKY-RIDE—Allied Mfg & Sales Co
SKY-TIE—Adalet Mfg Co
SKY-VENT—Buffalo Forge Co
SKYCEIL—Silvray Lighting Inc
SKYDOME—Nemco Electric Co
SKYLIFT—Automatic Transportation Co
SKYLIKE—Silvray Lighting Inc
SKYLINE—Arex Co
SKYLINER—Electro Lighting Corp
SKYLOUVER—Electro Lighting Corp
SKYLUME—Electro Lighting Corp
SKYRAY—Electro Lighting Corp
SKYSECTOR—Silvray Lighting Inc
Skyworker Corp—see Emhart Mfg Co
Slater Appliances Inc—see Slater Electric & Mfg Co Inc
Slater Electric & Mfg Co Inc 45 Sea Cliff Ave Glen Cove NY
Slater Electronics Inc—see Slater Electric & Mfg Co
Slaughter Co College & Young Sts Piqua 5 Ohio
SLEIGH-O-LITE—Cable Electric Products Inc
SLIMFIN—Tuttle & Kift Inc
SLIMFLUX—Guth (Edwin F) Co
SLIPKNOT—Plymouth Rubber Co Inc
SLO-LAG—Eagle Electric Mfg Co Inc
SLO-SPEED—Sterling Electric Motors Inc
SLO-SPIRAL—New England Carbide Tool Co Inc
SLO-SYN—Superior Electric Co
Sloane Mfg Co 7606 N Clybourn Ave Sun Valley Calif
SLUGIN—Star Expansion
SLUMBER GLO—Rodale Mfg. Co Inc
Small Motors Inc 2076 Elston Ave Chicago 14 Ill
SMALL TALK—Simpson (Mark) Mfg Co Inc
SMASON—Couch (SH) Co Inc
SMITH DOLAND—Electric Arc Inc
Smith & Dove Mfg Co—see Ludlow Mfg & Sales Co
Smith-Gates Corp Farmington Conn
Smith (F A) Mfg Co—see Fasco Industries
Smith Welding Equipment Corp 2633 4th St SE Minneapolis 14 Minn
Smithcraft Lighting 217 Everett Ave Chelsea 50 Mass
SMOKE-EYE—Heat Timer Corp
Smoot-Holman Co 321 N Eucalyptus Ave (P O Box 4097) Inglewood Calif
SMOOTH JAW—Champion DeArment Tool Co
SMOOTHIE—Circle F Mfg Co
SNAKE CHARMER—Barth Corp
SNAKE LEADER—Burbank Electrical Products
SNAP-IN—Reichert Float & Mfg Co
SNAP-ON—Tomic Sales & Engineering Co
Snap-on-Tools Corp 8028 28th Ave Kenosha Wis
SNAP-STRAPS—Blackhawk Industries
SNAPEE—Woodhead (Daniel) Co
SNAPICOIL—Wiremold Co
SNAPIN—Star Expansion
SNAPIT—Cable Electric Products Inc
SNAPLOX—Benjamin Division Thomas Industries Inc
SNO-FLAKE—Curtis Lighting Div
SNO-MELTER—Easy-Heat Inc
SNORKEL—Nemco Electric Co
SNOWLITE—Luxor Lighting Products Inc
SNUB-SEAT—Anderson Electric Corp
SNUGFIT—Paine Co
Snyder (M L) & Son Inc 1897 E York St Philadelphia 25 Pa
So-Cal Electro Products Inc 4423 W Jefferson Blvd Los Angeles 16 Calif
Soapstone Co—see Soapstone Duct Co
Soapstone Duct Co 3985 Beach St Oakland Calif
SOCKET CINCHER—Kees (F D) Mfg Co
SODERTITE—G & W Electric Specialty Co
Sola Electric Co 1719 Busse Rd Elk Grove Ill
Solar Electric Corp 121 Central Ave Warren Pa
Solar Light Mfg Co 400 North Ashland Chicago 22 Ill
SOLARLITE—Solar Light Mfg Co
SOLAVOLT—Sola Electric Co
SOLDERALL—Brach Mfg Co
SOLDEREZE—Phelps Dodge Copper Products Corp
SOLDERMASTER—Hexacon Electric Co
SOLDERUX—Mico Instrument Co
Solux Corp 58-17 28th Ave Woodside 77 LI NY
SOLVO-STAT—Hoyt Mfg Corp
SONALARM—Scott (H H) Inc
Sonotone Corp Elmsford NY
Soreng Div—see Controls Co of America
Sorensen & Co Inc Richards Ave South Norwalk Conn
Sorgel Electric Co 8388 W National Ave Milwaukee 4 Wis
Sorgel Transformer Co—see Sorgel Electric Co
Sound Equipment Corp—see Kwikheat Mfg Co
SOUND GUARD—Progress Mfg Co Inc
South River Metal Products Co Inc 377 Turnpike South River NJ
Southco Div South Chester Corp Lester Pa
Southeast Lighting Inc 521 E 20 St Charlotte 1 NC
Southern Carbon Brush Co Inc 7 18th St SW (P O Box 1710) Birmingham 1 Ala
Southern Electrical Equipment Co 308 W Bland at Mint St Charlotte 3 NC
Southwestern Industrial Electronics Co 10201 Westheimer (P O Box 22187) Houston 27 Tex
Southwire Co Carrollton Ga
SOVEREIGN—Miller Co
SPACE LITER—Sun-Lite Mfg Co
SPACE SAVER—Hyster Co
SPACEGRID—Ainsworth Lighting Inc
SPACELITER—Steber Mfg Co
SPACEMASTER—Lewis-Shepard Products Inc
SPACIALITE—Ainsworth Lighting Inc
Spang-Chalfant Div—see National Supply Co
SPANG—National Supply Co
SPANGLEAM—National Supply Co
SPANTAP—Burndy Corp
SPARKELITE—Duro-Test Corp
SPATIALITE—Manning (R A) Co Inc
SPATTERPROOF—Radiant Lamp Corp
Spaulding Fibre Co Inc 310 Wheeler St Tonawanda NY
SPAULDITE—Spaulding Fibre Co Inc
SPAULDO—Spaulding Fibre Co Inc
SPEAR—Jordan Co
Specialties Inc 2936 Sacramento St Pittsburgh 4 Pa
SPECTROLUX—Luxor Lighting Products Inc
SPEED CUT—Beaver Pipe Tools Inc
SPEED-KING—Beaver Pipe Tools Inc
SPEED-LINE—Garcy Lighting Div Garden City Plating & Mfg Co
SPEED-LOK—Cable Electric Products Inc
SPEED MEASURE—Waldman (John J) Co
SPEED-O-MATIC—Beaver Pipe Tools Inc
SPEED SPIRAL—Super Tool Co
SPEED THRU—Mercury Hydraulics Inc
SPEED-TROL—Sterling Electric Motors Inc
SPEEDAIRE—Dayton Electric Mfg Co
Speedex Mfg Co 418 S Wyman St Rockford Ill
SPEEDI NO-BOLT—Tomic Sales & Engineering Co
SPEEDMASTER—Accurate Engineering Co
SPEEDMASTER—Lewis-Shepard Products Inc
SPEEDOLET—Killark Electric Mfg Co
SPEEDOMAX—Leeds & Northrup Co
SPEEDRANGERS—Master Electric Div Reliance Electric & Engineering Co
SPEEDSAW—Thor Power Tool Co
SPEEDTOOLS—Thor Power Tool Co
SPEEDWAY—Wright Hoist Div
SPEEDWIRE—Slater Electric & Mfg Co Inc
Spencer Industries 1508 N Mascher St Phila 22 Pa
Spencer Studios—see Spencer Industries
Spencer Thermostat Div—see Metals & Controls Div
Spencer Turbine Co 486 New Park Ave Hartford 6 Conn
Spero Electric Corp 20500 St Clair Ave Cleveland 17 Ohio
Sperti Faraday Inc 1322 E Church St Adrian Mich
SPHERE—Versen (Kurt) Co
SPHEROLITE—Line Material Industries
Spies Electric Works 564 W Van Buren St Chicago 7 Ill
SPINFAST—Scranton Storage Battery Corp
SPIRAFIL—Phelps Dodge Copper Products Corp
SPIRAFLEX—General Insulated Wire Works Inc
SPIRAKORE—General Electric Co
SPIRAL-DRIVE—Arro Expansion Bolt Co
SPIRAL WRAP—Illumitronic Engineering
SPIRALOK—American Metal Moulding Co
SPIRALON—Surprenant Mfg Co
SPIRO-DUCT—Fairbanks Morse & Co
SPLAC—Westline Products Div Western Lithograph Co
SPLICIT—Burndy Corp
SPOOLARC—All-State Welding Alloys Co Inc
SPORTLITE—Duro-Test Corp
SPORTO—Appleton Electric Co
SPORTSLITER—Steber Mfg Co
SPOTTY—Curtis Lighting Div Curtis-All Brite Lighting
SPRA-MASK—Mystik Adhesive Products Inc
Sprague Electric Co North Adams Mass
Sprague Specialties Co—see Sprague Electric Co
SPRAYLITE—Silvray Lighting Inc
SPRAYO X—Preformed Line Products Co
SPRING-A-LITE—Joy Mfg Co
Spring City Electrical Mfg Co Spring City 85 Pa
Spring City Foundry Co—see Spring City Electrical Mfg Co
Spring Load Mfg Corp 6332 Maynard Ave Seattle Wash
SPRING-O-MATIC—Industrial Electrical Works
SPRING WING—Paine Co
SPRING WINGS—Rawlplug Co Inc
SPRINGIN—Star Expansion
Square D Co 6060 Rivard St Detroit 11 Mich
SQUARE DUCT—Square D Co
SQUEEZON—Kearney (James R) Corp
STA-KON—Thomas & Betts Co
Sta-Tite Mfg Co 2000 Wyandotte Kansas City 8 Mo
Sta-Warm Electric Co 53 N Chestnut St Ravenna Ohio
STAB-LOK—Federal Pacific Electric Co
Stab-Rite Electric Products Co—see Stabrite Fluorescent Mfg Co
STABIL-GLOW—Blue M Electric Co
STABIL-THERM—Blue M Electric Co
STABILINE—Superior Electric Co
STABREAKER—Federal Pacific Electric Co
Stabrite Fluorescent Mfg Co 3550 Northwest 49 St Miami Fla
Stackpole Carbon Co Stackpole St St Marys Pa
Stahl Metal Products Inc 3490 W 140 St Cleveland 11 Ohio
STAIRCART—O'Neil-Irwin Mfg Co
STAIRMASTER—Fairbanks Co
STAKLITE—Appleton Electric Co

STALEY—Electric Switch Corp
STALOC—Mallory (P R) & Co Inc
Stamford Lighting—see Stamford Metal Specialty Co Inc
Stamford Metal Specialty Co Inc 429 W Broadway New York 12 NY
Stampings Inc Suite 314 321 24th St Rock Island Ill
Stanat Mfg Co Inc 524 Shames Dr Westbury NY
Stanat Tool Machine Co—see Stanat Mfg Co Inc
STANDARD—Circle F Mfg Co
Standard Electric Div Standard Dayton Corp P O Box 1004 Dayton 1 Ohio
Standard Electric Mfg Co Inc Haddon Ave West Berlin NJ
Standard Electric Co Inc P O Box 6356 San Antonio 9 Tex
Standard Electric Time Co 89 Logan St Sprinfield 2 Mass
Standard Electrical Products Co 2240 E Third St Dayton 3 Ohio
Standard Portable Cord Co Inc Mayville NY
Standard Transformer Co 140 Dana St N E Warren Ohio
STANDCO—Sticht (Herman H) Co Inc
STANEON—General Cable Corp
Stanley-Carter Co—see Stanley Electric Tools
Stanley Electric Tools 436 Myrtle St New Britain Conn
Stanley Works—see Stanley Electric Tools
STAPUT FAIRLEADER—Barry (Williams B) Co
STAR—Standard Electric Co Inc
Star-A Electric Mfg Co Inc 269 Meserole St Brooklyn 6 NY
Star Expansion Mountainville NY
Star Expansion Bolt Co—see Star Expansion
STAR-GLO—Electro Lighting Corp
STAR-LUX—Curtis-AllBrite Lighting
STAR-LUX—Revere Electric Mfg Co
Star Porcelain Co Muirhead Ave Trenton 9 NJ
STARBRITE—Comet Lamp Co
STARLINE—Electro-Mechanical Instrument Co
STARPIN—Star Expansion
Starrett (LS) Co Athol Mass
STARSTUD—Star Expansion
START-O-METIC—Airserco Mfg Co Inc
STARTZIT—Aircraft Specialties Inc
STATELINE—Howard Industries Inc
States Co 19 New Park Ave Hartford 6 Conn
STATICATOR—Hewson Co Inc
STATICK—Hirschman-Pohle Co Inc
STATIKIL—Doyle (JE) Co
STATISCOPES—Mineral lac Electric Co
STAVOLT—Christie Electric Corp
STAXAUSTER—Allen Cooler Ventilator Inc
STAXRITE—Cutler-Hammer Inc
STAZ-RITE—Utilities Service Co
STAZIN—Star Expansion
Stearns Electric Coro 120 N Broadway Milwaukee 2 Wis
Stearns Magnetic Inc—Stearns Electric Corp
Steber Mfg Co 2700 Roosevelt Rd Broadview Ill
STEBERLITE—Steber Mfg Co
Steel City Electric Co 1207 Columbus Ave Pittsburgh 33 Pa
Steel Electric Products Co Inc 5602 18th Ave Brooklyn 4 NY
Steel & Tubes Inc—see Republic Steel Corp
STEELARC—All-State Welding Alloys Co Inc
Steelduct Co Republic Steel Bldg Youngstown Ohio
STEELFLEX—Universal Metal Hose Co
STEELGRIP—Armstrong-Bray & Co
STEELTITE—Eliza Metal Products Co
STEELWING—Hubbard & Co
Steiner-Ives Co Springfield Rd Union NJ
STEMMAN—Ringsdorff Carbon Corp
STERILAMP—Westinghouse Electric Corp Lamp Div
Sterling Blower Co 791 Windsor St Hartford Conn
Sterling Electric Motor Inc 5401 Telegraph Rd Los Angeles 22 Calif
Sternberg Mfg Co 4510 Addison St Chicago 41 Ill
Sterner Industries Winsted 1 Minn
Stevens Appliance Truck Co Norton Rd (P O Box 897) Augusta Ga
STEWART-AIRE—Stewart Industries Inc
Stewart Bros Div Instrument Laboratories 315 W Walton Pl Chicago 10 Ill
Stewart Industries Inc 320 E St Joseph St Indianapolis 2 Ind
Stewart Mfg Co Inc—see Stewart Industries Inc
Sticht (Herman H) Co Inc 27 Park Place New York 7 NY
STICK-VAR—Electro-Technical Products Div
STICKLEBACK—Tec Imports
STIRRUP—Burndy Corp
STIXWELL—Clifton Mfg Co Inc
STOCK PICKER—Rol-Away Truck Mfg Co Inc
Stocker & Yale Inc Green St Marblehead Mass
STOCKLITE—Appleton Electric Co
STOK-FOUNT—International Electric Fence Co Inc
Stokes (F J) Corp 5500 Tabor Rd Philadelphia 20 Pa
Stokes (F J) Machine Co—see Stokes (F J) Corp
Stonco Electric Products Co 333 Monroe Ave Kenilworth NJ
Stone Mfg Co—see Stonco Electric Products Co
Stone Paper Tube Co 900 Franklin St N E Washington 17 DC
Stonite Coil Corp US Highway 130 Yardville NJ
STORACK—American Steel Iron Works
STORAGE MASTER—Haertel (Walther) Co
Stow Mfg So 162 Shear St Binghamton NY
Stradley Engineering Co P O Box 6006 Pittsburgh 11 Pa
STRAIGHT-LINE—Leviton Mfg Co Inc
STRAIGHT-LINE—Lyon Rural Electric Co
STRATE-LINE—Pyle-National Co
Stratfield Co 434 Grand St Bridgeport 4 Conn
STRATO-LUX—Curtis Lighting Div
STRATO-RAY—Emerson-Pryne Co
STREAM COOLED—Baldor Electric Co
STRIALUX—Lightolier Inc
STRIKER—Star Expansion
STRING-A-LITE—Joy Mfg Co
STRINGER—Utilities Safety Supply Co Inc
STRIP EASE—Radix Wire Corp
STRIPMASTER—Ideal Industries Inc
STRIPSEAL—Burndy Corp
STROBOLUME—General Radio Co
STROBOLUX—General Radio Co
STROBOTAC—General Radio Co
Stromberg Electric Co—see Stromberg Time Corp
Stromberg Time Corp 135 S Main St Thomaston Conn
STRONGHOLD—Haartz-Mason Inc
STRUCTOR—Steel City Electric Co
Struthers-Dunn Inc Pitman NJ
STUD DRIVER—Remington Arms Co Inc
STUD-PINS—Fastway Fasteners Inc
STYLIST—Electro Lighting Corp
STYROFLEX—Natvar Corp
SUBALOX—Subox Inc
SUBMATIC—Franklin Electric Co Inc
SUBMERSIPOOL—Franklin Electric Co Inc
Subox Inc Fairmount Plant Hackensack NJ
SUBURBAN—Reed Unit-Fans Inc
SUBURBANITE—Miller Co Illuminating Div
Suclar Laboratories Inc 1197 McCarter Highway Newark NJ
SUDDEN DEPTH—Paine Co
Suflex Corp 33-40 57th St Woodside 77 NY
Sulflo Inc 1143 E Jersey St Elizabeth 4 NJ
Sultan Electric Co—see Acme Lighting & Mfg Co
Sultan Lighting Co—see Acme Lighting & Mfg Co
Summit Instrument Co—see Seely Instrument Co Inc
SUMPTROL—Square D Co
Sun Electric Products Inc 28 S Day St Orange NJ
Sun-Lite Mfg Co 2555 Bellevue Ave Detroit 7 Mich
Sun-Tron Corp 7435 W Wilson Ave Chicago 31 Ill
Sunbeam Lighting Co 777 E 14th Pl Los Angeles 21 Calif
Sunbeam Visionaire Lighting Co—see Sunbeam Lighting Co
Sundh Electric Co—see Clark Controller Co
Sunrise Products Co—see Vemaline Products Co
SUNSWITCH—Ripley Co Inc
Sunwarm Inc 1601 Jared Dr (P O Box 266) Kingsport Tenn
SUPAIRTHERMAL—Nordberg Mfg Co
SUPER—Surelite Products Co
SUPER CORONOL—General Electric Co Wire & Cable Dept
SUPER CYCLE—Chicago Pneumatic Tool Co
SUPER DREADNAUGHT—Gould-National Batteries Inc
SUPER-EONITE—Kaiser Aluminum & Chemical Sales Inc
SUPER-GRIP—Diamond Expansion Bolt Co Inc
SUPER HI—Westinghouse Electric Corp Lamp Div
SUPER INDUSTRIAL—National Specialties Co Inc
SUPER-LAG—Bussmann Mfg Div
SUPER-LOK—Steber Mfg Co
SUPER MAGNET—Cutler-Hammer Inc
SUPER POWER—Coffing Hoist Div
SUPER-POWER—Ramset Fastening System
SUPER SERVICE—General Cable Corp
SUPER SPEED-LINE—Garcy Lighting Div Garden City Plating & Mfg Co
SUPER-STIK—Superior Insulating Tape Co
SUPER SUCTION—National Super Service Co
Super Tool Co 21650 Hoover Rd Detroit 13 Mich
SUPER-V-BEAM—Duro-Test Corp
SUPERBUILT—Electrical Mfg Co
SUPERCON—Superior Electric Co
SUPERIOR—Champion DeArment Tool Co
SUPERIOR—Erie Tool Works
SUPERIOR—Round (David) & Son Inc
SUPERIOR—Wall (P) Mfg Co
Superior American Fire Alarm Div—see SAFA Alarm Div
Superior Appliance Co—see Superior Interlock Corp
Superior Carbon Products Co 9115 George Ave Cleveland 5 Ohio
Superior Electric Co 83 Laurel St Bristol Conn
Superior Electric Mfg Co Inc—see Eagle Electric Mfg Co Inc
Superior Insulating Tape Co 3100 Lambdin Ave St Louis 15 Mo
Superior Interlock Corp 73-39 Central Ave Glendale 27 NY
Superior Mfg Co—see Superior Staple Mfg Co
Superior Porcelain Co 931½ Market St Parkersburg W Va
Superior Staple Mfg Co 40 Commercial St Fitchburg Mass
SUPERJUSTABLE—Williams (J H) & Co
SUPERMARKETER—Miller Co
SUPERMATER—Willard Storage Battery Div
SUPERRENCH—Williams (J H) & Co
SUPERSAW—RCS Tool Corp
SUPERSEAL—Anaconda Wire & Cable Co
SUPERSHEATH—General Cable Corp
SUPERSOCKET—Williams (J H) & Co
SUPERTEL—General Cable Corp
SUPERTITE—Engelhard (Charles) Inc
SUPRAMICA—Mycalex Corp of America
SUPREME—Kaiser Aluminum & Chemical Sales Inc
SUPREME—New England Carbide Tool Co Inc
SUPREME—Scranton Storage Battery Corp
Supreme Electric Products Co 194 Vassar St Rochester 7 NY
SUPRENE—Collyer Insulated Wire Co
Supro Lux Mfg Co Inc 406-416 E 161 St New York 51 NY
SUR-GROUND—So-Cal Electro Products Inc
SURCO—Surprenant Mfg Co
SURE-BUILT—Shure Mfg Corp
SURE-LITE—House-O-Lite Corp
SURELITE—Clean Sweep Co
Surelite Products Co 368 E 148 St New York 55 NY
Surety Rubber Co North High St Carrollton Ohio
SURF-A-LITE—Electro Lighting Corp
SURFA-ETCH—Rust-Oleum Corp
SURFA-SELE—Rust-Oleum Corp
SURFACEDUCT—National Electric Div
SURFACELINE—Miller Co Illuminating Div
SURFEX—Pass & Seymour Inc
SURFLENE—Surprenant Mfg Co
SURFLEX—Surprenant Mfg Co
SURFLINER—Westinghouse Electric Corp
SURFLOW—Surprenant Mfg Co
Surprenant Mfg Co 199 Washington St Boston 8 Mass
Surrette Storage Battery Co Inc Jefferson Ave Salem Mass
SURVO—Surprenant Mfg Co
SUTCO—Sutton (O A) Corp
Suttle Equipment Co 135 S LaSalle St Chicago 3 Ill
Sutton (O A) Corp 1812 W Second Wichita Kans
Swan Mfg Co 1801 W 26 St Vancouver Wash
SWAN-STATS—Swan Mfg Co
SWEATRITE—Dunton (MW) Co
SWEDG-ON—Lenco Inc
Swedish Iron & Steel Corp 910 Westfield Ave Elizabeth NJ
Swett (A L) Iron Works 166 Glenwood Ave Medina NY
SWING-AWAY—Electrical Mfg Co
SWING-EASY—Anderson (Albert & JM) Mfg Co
SWING TOP—Electrical Fittings Corp
SWING-WA—General Electric Co
Swiss Jewel Co 225 Lafayette Bldg Phila 6 Pa
SWITCH-KING—Cable Electric Products Inc
SWITCH MAT—Recora Co Inc
SWITCH-O-LITE—Hoffman Engineering Corp
SWITCHETTE—General Electric Co
SWITCHMATIC—Eagle Electric Mfg Co Inc
Swivelier Co Inc Nanuet NY
SWIVELITE—Amplex Corp
SYLKYD—Dow Corning Corp
SYLVALOY—Driver (Wilbur B) Co
Sylvania Electric Products Inc 1740 Broadway NY 19 NY
SYNALITE—Mitchell Lighting Div
SYNCHRON—Hansen Mfg Co Inc
SYNCHROSTAT—Electric Machinery Mfg Co
SYNCRAMENTAL—Leland (GH) Inc
SYNCRO-BREAK—Square D Co
SYNCRO-SPEDE—Allis (Louis) Co
SYNCROGEAR—U S Electrical Motors Inc
SYNDUCTION—Allis-Chalmers Mfg Co
SYNKOTE—Plastoid Corp
SYNROFLASHING—Blackhawk Industries
SYNRUB—Kaiser Aluminum & Chemical Sales Inc
SYNTHAMICA—Mycalex Corp of America
SYNTHITE—Dolph (John C) Co
SYNTHOL—Crescent Insulated Wire & Cable Co
SYNTHOLVAR—Varflex Corp
Syntron Co 690 Lexington Ave Homer City Pa
System Analyzer Corp 700 W State St Nokomis Ill

T

TA Mfg Corp 4607 Alger St Los Angeles 39 Calif
T & B—Thomas & Betts Co
T-D—Chase-Shawmut Co
TEC—Circle F Mfg Co
TK—Tuttle & Kift Inc
T-POWER—Motorola Communications & Electronics Inc
T V Wire Products—see Tevco Insulated Wire
T-W—Taylor-Winfield Corp
TAB-WELD—Electric Controller & Mfg Co
Taco West Corp—see West Instrument Corp
Taitco Div Tait Mfg Co 500 Webster St Dayton 1 Ohio
TAKK—Hewson Co Inc
Tal Bender Inc—see Hein-Werner Corp
Talk-A-Phone Co 5013 N Kedzie Ave Chicago 25 Ill
TALKMASTER—Dalmotron Co
TALL REACH—Kett Tool Co
TALLESCOPE—Up-Right Inc
TAMPIN—Star Expansion
TAN-O-MITE—Ohmite Mfg Co
TAND-O-LITE—House-O-Lite Corp
TANKTROL—Automatic Control Co
TANSOL—Mallory (P R) & Co Inc
TANTALYTIC—General Electric Co
TAN-A-RAY—Penetray Corp
TAP-EEZ—Bryant Electric Co
TAP LITE—Minneapolis-Honeywell Regulator Co
TAP-ON—Tomic Sales & Engineering Co
TAPE CHASER—Chase & Sons Inc
TAPE-MATE—Holub Industries Inc
TAPERDRUM—Art Metal Co
TAPIT—Burndy Corp
TARGET—Anchor Packing Co
TATTELITE—Sittler Corp
TATTELITE-TESTER—Rodale Mfg Co Inc
TAURIL—Anchor Packing Co
Taylor (R W) Electric Co—see Taylor Electric Inc
Taylor Electric Inc 15400 Dale Detroit 23 Mich
Taylor Fibre Co Norristown Pa
Taylor-Winfield Corp 1052 Mahoning Ave NW Warren Ohio
TAYLORITE—Taylor Fibre Co
TAYLORON—Taylor Fibre Co
Tec Imports 15001-03 Califa St Van Nuys Calif
Technical Electronics Corp—see Technical Electronics Co

Technical Electronics Co 4060 Ince Blvd Culver City Calif
TECHNITE—Capewell Mfg Co
Tedcar Products Co Box 1209 Union NJ
TEEL—Dayton Electric Mfg Co
TEELON—Benjamin Electric Mfg Co
Tektronix Inc P O Box 500 Beaverton Ore
TEL-A-PIPE—Westline Products Div
TEL-ALARM—Industrial Automation Corp
TEL-ALARM—Tigerman Engineering Co
TEL-O-SET—Minneapolis-Honeywell Regulator Co
TELAPPROACH—American District Telegraph Co
Telcon Inc P O Box 216 Pacific Palisades Calif
TELEC-CON—Southwestern Plastic Pipe Co
TELECABLE—Whitney Blake Co
TELECATOR—Automatic Control Co
TELECOM—Webster Electric Co
TELECORD—Whitney Blake Co
TELECORDER—Automatic Control Co
TELEDUCT—Whitney Blake Co
TELEFRAME—Whitney Blake Co
TELEGROUND—Whitney Blake Co
TELEMAND—I-T-E Circuit Breaker Co
TELEPRENE—Whitney Blake Co
TELESCAN—Automatic Control Co
TELESCOPER—Economy Engineering Co
TELESCOPIC—Kulka Electric Corp
TELESEAL—Whitney Blake Co
TELESTER—Automatic Control Co
TELETALK—Webster Electric Co
TELETHERM—American District Telegraph Co
TELETROF—Howard Electric Co
TELETROL—Automatic Control Co
TELEVOLT—Sola Electric Co
TEMCO—Electrical Mfg Co
TEMFLEX—Minnesota Mining & Mfg Co Irvington Div
TEMP-R-TAPE—Connecticut Hard Rubber Co
TEMPA-TUBE—Acra Electric Corp
TEMPALL—Tobe Deutschmann Corp
TEMPBRAID—HiTemp Wires Inc
TEMPCLAD—HiTemp Wires Inc
Templeton Kenly & Co Gardner Rd Broadview Ill
TEMPOTHERM—General Controls Co
TEMPRENE—HiTemp Wires Inc
TEMPREX—HiTemp Wires Inc
TEMPRITE—HiTemp Wires Inc
TEMPTUBE—HiTemp Wires Inc
TEMTROL—Penn Controls Inc
TENAX—Diamond Expansion Bolt Co Inc
TENNA-ROTOR—Alliance Mfg Co Inc
TENNA-SCOPE—Alliance Mfg Co Inc
TENNA-SHINGLE—Javex
TENNA-TUBE—Javex
TENS-A-MATIC—Murray Equipment Co Inc
TENSILOK—General Cable Co
TENSITE—Driver (Wilbur B) Co
Tensolite Insulated Wire Co Inc West Main St Tarrytown NY
TENX—General Electric Co—Wire & Cable Dept
Terado Co 1068 Raymond Ave St Paul 14 Minn
TERMINAL BLOCKS—Wama Co
TERMITE—Relton Corp
Termite Drills Inc—see Relton Corp
TERRA-TRAN—R T & E Corp
TESCO—Eastern Specialty Co
TESTO LITES—Brach Mfg Co
TETCO—Electric Tachometer Corp
Texco Insulated Wire 108 E Prospect Ave Burbank Calif
Texas Creosoting Co P O Box 131 Orange Tex
TEXSLIDE—Allis-Chalmers Mfg Co
Tey Mfg Co—see Emhart Mfg Co
Theiler (H J) Corp Ashmont Ave Whitinsville Mass
Thepitt Mfg Co Gregg & Hammond Sts Carnegie Pa
Ther Electric & Machine Works 17 S Jefferson St Chicago 6 Ill
THER-MONIC—Induction Heating Corp
THERM-O-METER—Simpson Electric Co
THERM-O-TRON—Trindl Products Ltd
THERMA-MARK—North Shore Nameplate Div
Thermador Electrical Mfg Co 5119 District Blvd Los Angeles 22 Calif
THERMAL-AIRE—Garden City Fan & Blower Co
Thermal-Aire Inc—see Thermal-Aire of America Inc
Thermal-Aire of America Inc 1060 Broad St Newark 2 NJ
Thermal American Fused Quartz Co 18 Salem St Dover NJ
Thermal Syndicate Ltd—see Thermal American Fused Quartz Co
THERMALEZE—Phelps Dodge Copper Products Corp
THERMALINE—General Electric Co
THERMALINE—Line Electric Co
THERMALL—LaRose (WT) & Associates Inc
THERMALOAD—Monitor Controller Co
THERMALON—HiTemp Wires Inc
THERMOSTATIC—Wall (P) Mfg Co
THERMASTER—Willard Storage Battery Div
THERMATROL—Hatfield Wire & Cable Div
THERMAZIP—Zippertubing Co
THERMISTEMP—Yellow Springs Instrument Co Inc
Thermo Electric Mfg Co 513 Huff St Dubuque Iowa
THERMO-GRIP—Ideal Industries Inc
THERMO-TIP—Ideal Industries Inc
THERMO-TRIEX—Triangle Conduit & Cable Co Inc
THERMOLAIN—Star Porcelain Co
THERMON Mfg Co 1017 Rosine St Houston Tex
THERMOPILOT—General Control Co
THERMOPLAX—Cutler-Hammer Inc
THERMOPRENE—Whitney Blake Co
THERMOSWITCH—Fenwal Inc
THERMOWELD—Burndy Corp
THETA—Trombetta Solenoid Corp
Thiel Tool & Engineering Co 1417 N Market St St Louis 6 Mo
THIMBLEYE—Chance (A B) Co
THIN LINE—Sun-Lite Mfg Co
THINETTE—General Electric Co
THINLINE—General Electric Co
THINPLATE—Park Nameplate Co Inc
THIRTY—Gould-National Batteries Inc
3RD WAY—Remington Corp
Thomas Associates—see TA Mfg Corp
Thomas & Betts Co 36 Butler St Elizabeth 1 NJ
Thomas Instrument Co Box 41 Liverpool Rd Phoenix NY
Thomas (R) & Sons Co—see Delta-Star Electric Div
HK Porter Co Inc
Thompson Electric Co P O Box 873 Cleveland 22 Ohio
Thompson Mfg Co 611 Stevens St Geneva Ill
Thor Power Tool Co 175 N State St Aurora Ill
THOREX—Ohio Brass Co
THRED-O-MATIC—Collins Machinery Corp
THREE "E"—Electrical Engineers Equipment Co
THREE "G"—Gruber Bros Inc
THREE-U-LITE—Northern Incandescent Lamp Co
THRIFTY—Marathon Battery Co
THUNDER-TWIST—New England Carbide Tool Co Inc
THUNDERBOLT—Vulcan Electric Co
THYMOTROL—General Electric Co
TI-CO—Thomas Instrument Co
TI-MITE—Paragon Electric Co
TIFFIN—Quincy Mfg Co
TIGER—Boston Woven Hose & Rubber Co
TIGER BRAND—American Steel & Wire Div United States Steel Corp
Tigerman Engineering Co 4332 N Western Ave Chicago 18 Ill
Tilden Tool Mfg Co 209 Los Molinos San Clemente Calif
TIME-A-TROL—Acro Switch Div
TIME-ALL—International Register Co
TIME-MINDER—International Register Co
TIMEMASTER—Willard Storage Battery Div
Times Appliance Co—see Times Wire & Cable Co
Times Wire & Cable Co Wallingford Conn
TIN-EZY—Johnson Mfg Co Inc
TINOL—American Solder & Flux Co
TINY-GLOW—Industrial Devices Inc
TINY-MITE—Jordan Electric Products Div
TINYLITES—Drake Mfg Co
TIP-TOP—General Cable Corp
TIP TOP—Relton Corp
TIPIT—Shaw-Box Crane & Hoist Div Manning Maxwell & More Inc
TIREX—Simplex Wire & Cable Co
TITAN—Detroit Hoist & Machine Co
Titchener (E H) & Co 67 Clinton St Binghamton NY
TITE-BIND—Thomas & Betts Co
TITE-BITE—Thomas & Betts Co
TITEBILT—Phelps Dodge Copper Products Corp
Tobe Deutschmann Corp Providence Highway Norwood Mass
Tocco Div Ohio Crankshaft Co 3800 Harvard Ave Cleveland 5 Ohio
Tod-Lite Inc 3401 N W 10 St Oklahoma City Okla
TOG-L-SNAP—I-T-E Circuit Breaker Co
Toledo Commutator Co 1101 S Chestnut St Owosso Mich
Toledo Pipe Threading Machine Co 1445 Summit St Toledo 4 Ohio
Toledo Standard Commutator Co—see Toledo Commutator Co
Tolen (William) & Son Inc 4041 Ridge Ave Philadelphia Pa
Tomic Sales & Engineering Co 20000 Sherwood Ave Detroit 34 Mich
TONEPAK—Lee Electric Inc
TONG-TEST—Columbia Electric Mfg Co
TOOTS-E—Lovsted (C M) & Co Inc
Topflight Corp 160 E 9th Ave York Pa
Topflight Tape Co—see Topflight Corp
Topflight Tool Co—see Topflight Corp
TOPHBESTOS—Driver (Wilbur B) Co
TOPHET—Driver (Wilbur B) Co
TOPLITE—Swivelier Co Inc
TOPNOTCH—Day-Brite Lighting Inc
TOPPER—Hubbell (Harvey) Inc
TORCH-O-MATIC—Mine Safety Appliances Co
Tork Clock Co Inc—see Tork Time Controls Inc
TORK-MASTER—General Control Corp
Tork Time Controls Inc 1000 Grove St Mt Vernon NY
TORKMASTER—Tork Time Controls Inc
TORKOL—Line Material Industries
TORNADO—Breuer Electric Mfg Co
TORPEDO—Swivelier Co Inc
TORQUE LIFT—Atlas Overhead Door Co
TORQUETROL—Electronic Control Corp
Torrington Co 59 Field St Torrington Conn
TORRIVENT—Trane Co
TOTALUME—Wilbur & Williams Co
TOTRUST—Wilbur & Williams Co
TOUCH-A-MATIC—Eagle Electric Mfg Co Inc
Touch-Plate Mfg Corp Box 1970 Long Beach Calif
TOUCHETTE—Rodale Mfg Co Inc
Tower Craftsmen Inc 105 Chestnut St Red Bank NJ
TOWN & HIGHWAY—Westinghouse Electric Corp
TOYLIGHT—Aerolux Lights Corp
TRA-BAK—Great Northern Mfg Corp
TRAC-O-LITE—Comet Lamp Co
Trade Service Publications Inc 341 E Ohio St Chicago 11 Ill
Trade-Wind Div Robbins & Myers Inc 7755 Paramount Pl Pico Rivera Calif
Trade-Wind Motorfans Inc—see Trade-Wind Division Robbins & Myers Inc
TRADELITER—Duro-Test Corp
TRAFFLEX—Crouse-Hinds Co
Trane Co 2nd & Cameron Ave La Crosse Wis
TRANFO-UNIT—I-T-E Circuit Breaker Co
TRANOLSEAL—Johns-Manville
TRANS-O-MATIC—Lake Shore Electric Corp
TRANSACTOR—Stromberg Time Corp
TRANSCO—Coil Co of America Inc
TRANSIS-TALK—Simpson (Mark) Mfg Co Inc
TRANSISTA FLASH—U-C Lite Mfg Co
TRANSITE—Johns-Manville
Transolite Corp 550 Fifth Ave New York 36 NY
TRANSPORTER—Automatic Transportation Co
TRANSRACK—Sangamo Electric Co
TRANSRIDER—Automatic Transportation Co
TRANSTACKER—Automatic Transportation Co
TRANSTRACTOR—Automatic Transportation Co
TRANSVERTER—Hertner Electric Co
TRANSVEYOR—Automatic Transportation Co
TRAP-DRI—Controls Co of America
TRAPIT—Controls Co of America
TRAV-ELECTRIC—Terado Co
TRAVEL TOWER—Pitman Mfg Co
TREADLITE—Linemaster Switch Corp
TRENCHLAY—General Cable Corp
Trent (Harold E) Co—see Trent Inc
Trent Inc 201-299 Leverington Ave Phila 27 Pa
TRI-AMP—Radio Receptor Co Inc
TRI-BIT—Arro Expansion Bolt Co
TRI-CLAD—General Electric Co
TRI-FLUX—Redmond Co Inc
TRI-LITE—Artistic Lamp Mfg Co Inc
TRI-ONIC—Chase-Shawmut Co
TRI-PAK—Perfection Industries Div Hupp Corp
Tri-Part Mfg Co 925 Cherry St Detroit 1 Mich
TRI-PHASE—Taylor-Winfield Corp
TRI-WAY—U S Expansion Bolt Co
TRIADRY—Triangle Conduit & Cable Co Inc
Triangle Conduit & Cable Co Inc Triangle & Jersey Aves New Brunswick NJ
Triangle Equipment Co Inc 45 River Rd Nutley 10 NJ
Triangle Instruments Co—see Epco Electronics Inc
Trico Fuse Mfg Co 2948 No 5th St Milwaukee 12 Wis
TRICO-MIST—Trico Fuse Mfg Co
TRICON—Triangle Conduit & Cable Co Inc
TRIEX—Triangle Conduit & Cable Co Inc
TRIFORMANCE—Triangle Conduit & Cable Co Inc
TRIG—Rustan Corp
TRIG-R-HEAT—Wall (P) Mfg Co
TRIG TOWERS—Rostan Corp
Trimount Instrument Co 3119 W Lake St Chicago 12 Ill
Trindl Products Ltd 1807-11 S Clark St Chicago 16 Ill
Trine Mfg Corp 1430 Ferris Place New York 61 NY
Trio Laboratories Inc Expressway Industrial Park Plainview NY
TRIOLENE—Triangle Conduit & Cable Co Inc
TRIOLINE—Triangle Conduit & Cable Co Inc
TRION—Chase-Shawmut Co
TRIONET—Chase-Shawmut Co
TRIONODE—Walkirt Co
TRIOPRENE—Triangle Conduit & Cable Co Inc
TRIOSEAL—Triangle Conduit & Cable Co Inc
TRIOZONE—Triangle Conduit & Cable Co Inc
TRIP-O-LINK—Kearney (James R) Corp
TRIP-OUT—Kearney (James R) Corp
TRIP-SAVER—Kearney (James R) Corp
TRIP-X-TAP—Dossert Mfg Corp
TRIPLE-A—Quigley Co Inc
Triple-A Specialty Co 2835 N Western Ave Chicago 18 Ill
Triplett Electrical Instrument Co 286 Harmon Rd Bluffton Ohio
TRIPLEYE—Chance (A B) Co
TRIPLOC—Pyle-National Co
TRIPLOX—Nemco Electric Co
TRIPOMATIC—Kearney (James R) Corp
Trippe Mfg Co 133 N Jefferson St Chicago 6 Ill
TRIPRUF—Triangle Conduit & Cable Co Inc
TRISTEEL—Triangle Conduit & Cable Co Inc
Triton Mfg Co Inc East Haddam Conn
TROJAN—Hexacon Electric Co
TROL-E-DUCT—BullDog Electric Products Div
TROLLEYPHONE—Femco Inc
Trombetta Solenoid Corp 329 N Milwaukee St Milwaukee 2 Wis
TROMBOLITE—Amplex Corp
TRON—Bussmann Mfg Div
TROPIC-GLO—Knapp-Monarch Co
TROPIC-AIRE—Coolerator Div McGraw-Edison Co
TROUBLE SAVER—Patent Scaffolding Co Inc
TRU-SET—Ramset Fastening System
TRU-TORK—Nankervis (Geo L) Co
TRU-WHITE—Duro-Test Corp
Truco Masonry Drilling Div Wheel Trueing Tool Co 3200-3220 W Davison Ave Detroit 38 Mich
TRUCOLITE—Guth (Edwin F) Co
Trumbull Components Dept—see General Electric Co
Trumbull Electric Mfg Co—see General Electric Co
TUBELOX—Patent Scaffolding Co Inc
TUBENDERS—Henderson Electric Co
TUBETROF—P-W Industries Inc
TUBEWELD—Electric Tube Products
TUCALL—Edwards Co Inc
TUCKAWAY—Perfection Industries Div
TUFFEX—Everwarm Inc
TUG—Mercury Mfg Co
TUGIT—Shaw-Box Crane & Hoist Div Manning Maxwell & Moore Inc
TULAMP—General Electric Co
TULITO—Meyer Machines Inc
Tulsa Winch Div Vickers Inc 815 E First St Tulsa 20 Okla
TUMB-L-TITE—U S Expansion Bolt Co
TUMBLIN—Star Expansion
TUMS—Hykon Mfg Co
TUNGAR—General Electric Co
TUR-O-STRIP—House-O-Lite Corp
TURBO-COMPRESSORS—Spencer Turbine Co
TURBO-JET—Allis-Chalmers Mfg Co

Turbo Machine Co Lansdale Pa
TURBO-RUPTOR—Allis-Chalmers Mfg Co
TURBO-VAC—Kent Co
TURBOVANE—Westinghouse Electric Corp
Turco Products Inc 24600 S Main St Wilmington Calif
TURCO-SOLV—Turco Products Inc
TURN TYTE—Rodale Mfg Co Inc
TURNDICATOR—General Controls Co
Turner Brass Works 821 Park Ave Sycamore Ill
TURNEX—Woodhead (Daniel) Co
TURNLOK—Pass & Seymour Inc
TURQUOISE—Duro-Test Corp
TURRET—General Electric Co
Tuttle & Kift Inc 1823 N Monitor St Chicago 39 Ill
TWIN—General Electric Co
TWIN-LUG—Blackburn (Jasper) Corp
TWIN-SIX—Burgess Battery Co
TWIN ZONE—Hoyt Mfg Corp
TWINDUCT—National Electric Div H K Porter Co
TWINEYE—Chance (A B) Co
TWINLINE—York Div Borg-Warner Corp
TWIST-IN—Tomic Sales & Engineering Co
TWIST-LOC—Universal Metal Hose Co
TWIST-LOCK—Hubbell (Harvey) Inc
TWIST-MOUNT—Pyramid Electric Co
TWIST-RACK—P-W Industries Inc
TWIST-TITE—Hubbell (Harvey) Inc
TWO-SHOT—Kaiser Aluminum & Chemical Sales Inc
TY-RAP—Thomas & Betts Co
TYNEE-DRY—Pyramid Electric Co
TYNISWITCH—Detroit Controls Div
TYTEX—Exide Industrial Div
TYTON—U S Expansion Bolt Co

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U-BLADE—Leviton Mfg Co Inc
U-C-Lite Mfg Co 1050 W Hubbard St Chicago 22 Ill
U-RAD—Wiegand (Edwin L) Co
U-RE-LITE—I-T-E Circuit Breaker Co
U S E—U S Expansion Bolt Co
USG—United States Graphite Co
UTC—United Transformer Corp
UCILON—Metal & Thermit Corp
UFLEX—Hatfield Wire & Cable Div Continental Copper & Steel Industries Inc
Ulanet (George) Co 413-15 Market St Newark 5 NJ
ULTI-MOLD—Royal Electric Corp
ULTRA-FLEXARMS—White (O C) Co
ULTRA-LITE—Revere Electric Mfg Co
ULTRA-LUX—Garcy Lighting Div
ULTRA-VAPOR—Viking Air Products
Ultra-Violet Products Inc 5114 Walnut Grove Ave San Gabriel Calif
ULTRAFLEX—Cutler-Hammer Inc
ULTRALUME—Westinghouse Electric Corp Lamp Div
ULTRATUBE—Plastoid Corp
ULTRAVALVE—General Control Co
ULTRAVERTER—Blonder-Tongue Laboratories Inc
UNADCO—United Mfg Co
UNDARK—United States Radium Corp
UNI-BALLAST—Line Material Industries
UNI-BUS—Electric Distribution Products Inc
UNI-BUS—Electric Machinery Mfg Co
UNI-CAST—Redmond Co Inc
UNI-CLIP—Unistrut Products Co
UNI-CORE—Alpha Metals Inc
UNI-CRIMP—Sherman (H B) Mfg Co
UNI-DRIVE—Fairbanks Morse & Co
UNI-FORM'D—Zinsco Electrical Products
UNI-LARM—Russell & Stoll Co Inc
UNI-PACT—Sperti Faraday Inc
UNI-TOG—Kirkwood Commutator Corp
UNIBRAKES—Master Electric Div
UNICHROME—Metal & Thermit Corp
UNICLAD—G & W Electric Specialty Co
UNICLOSED—U S Electrical Motors Inc
UNIFIED—Lake Shore Electric Corp
UNIFLEX—Zinsco Electrical Products
UNILET—Appleton Electric Co
UNILING—Pass & Seymour Inc
UNILITE—Electro Lighting Corp
Unimax Switch Div W L Maxson Corp Ives Rd Wallingford Conn
UNION—Multi Electric Mfg Inc
Union Carbide Corp Silicones Div 30 E 42 St New York 17 NY
Union Equipment Sales Corp 1539 Superior Ave Cleveland 14 Ohio
Union Insulating Co Inc Box 351 Parkersburg W Va
Union Metal Mfg Co 1432 Maple Ave Canton 5 Ohio
UNIPAK—Sprague Electric Co
UNISEAL—Franklin Electric Co Inc
UNISEAL—Johns-Manville
UNISHEAR—Stanley Electric Tools
UNISPEED—Stromberg Time Corp
UNISPLICE—Burndy Corp
Unistrut Products Co 933 Washington Blvd Chicago 7 Ill
UNIT BLO—United Blower Co Inc
UNIT-VERSAL—BullDog Electric Products Co
UNITAP—Dossert Mfg Corp
United Blower Co Inc 193 Centre St NY 13 NY
United Chromium—see Metal & Thermit Corp
United Cinephone Corp—see Ripley Co Inc
United Electric Controls Co 85 School St Watertown 72 Mass
United Electric Machinery Co 1824E N 72 Ct Elmwood Park Ill
United Electric Motor Co 178 Centre St NY 13 NY
United Enterprises 15735 S Paramount Blvd Paramount Calif
United Lighting & Ceiling Co 2828 Ford St Oakland 1 Calif
United Mfg Co 41 Haig St Hamden 14 Conn
United Pressed Products Co—see UPPCO
United Transformer Corp 150 Varick St New York 13 NY
United States Air Conditioning Corp P O Box 360 Delaware Ohio
U S Electrical Motors Inc 200 E Slauson Ave Los Angeles 54 Calif
United States Electrical Tool Co 3640 Llewellyn St Cincinnati Ohio
United States Electronics Corp 275 Warren St Lyndhurst NJ
U S Expansion Bolt Co State St & PRR York Pa
U S Gauge Co—see U S Gauge Div
U S Gauge Div American Machine & Metals Inc Clymer Ave Sellersville Pa
United States Graphite Co 1621 Holland Ave Saginaw Mich
U S JUNIOR—Trine Mfg Corp
U S MOTORS—U S Electrical Motors Inc
United States Motors Corp 102 W 5th Ave Oshkosh Wis
U S PEERLESS—United States Rubber Co
United States Petroleum Co 104 Lakeview Ave Clifton NJ
United States Radium Corp Hanover Ave Morristown NJ
U S Relay-Electronics 717 N Coney Ave Azusa Calif
U S REVERE—United States Rubber Co
U S ROYAL—United States Rubber Co
United States Rubber Co 1230 Avenue of the Americas New York 20 NY
United States Rubber Co Naugatuck Chemical Div 946K Elm St Naugatuck Conn
U S Rubber Co Wire & Cable Div—see Kaiser Aluminum
U S SENIOR—Trine Mfg Corp
UNITOP—Allis-Chalmers Mfg Co
UNITRAN—Moloney Electric Co
UNITRANE—Trane Co
UNITRIP—Stromberg Time Corp
UNITROL—Cutler-Hammer Inc
UNITRON—I-T-E Circuit Breaker Co
UNITYPE—Superior Interlock Corp
UNIVERSAL—Hossfeld Mfg Co
UNIVERSAL—Mueller Electric Co
UNIVERSAL—Pittsburgh Reflector Co
Universal Clay Products Co 1558 First St Sandusky Ohio
Universal Electric Co 300 E Main St Owosso Mich
Universal Electric Sales Corp 3537 Lee Rd Cleveland 20 Ohio
Universal Mfg Corp 29-51 E 6th St Paterson NJ
Universal Metal Hose Co 2133 S Kedzie Ave Chicago 23 Ill
Universal Motor Co 438 Universal Dr Oshkosh Wis
Universal Power Corp—see Universal Electric Sales
Universal Welder Corp—see Universal Electric Sales
Universal Winding—see Leesona Corp
Up-Right Inc Up-Right Scaffolds Div 1013 Pardee St Berkeley 10 Calif
UPLIFTER—Revolvator Co
UPPCO 900 S Desplaines St Chicago 7 Ill
Uptegraff Mfg Co R E P O Box 182 Scottdale Pa
URBAN LITE—Revere Electric Mfg Co
Urell Inc 43 Main St Bradford Pa
USAIRCO—United States Air Conditioning Corp
USCO Power Equipment Corp 829 N 36th Way Birmingham 4 Ala
Utica Drop Forge Tool Corp—see Utica Drop Forge & Tool Div
Utica Drop Forge & Tool Div Kelsey-Hayes Co Utica 4 NY
UTIL-A-TOOL—Templeton Kenly & Co
UTIL-A-VENT—General Blower Co
UTILICON—Diamond Power Specialty Corp
UTILISCOPE—Diamond Power Specialty Corp
UTILITE—Steber Mfg Co
Utilities Safety Supply Co Inc Jefferson St & Highway 50 Lee's Summit Mo
Utilities Service Co 1 Pine St Allentown Pa
UTILITY—Arex Co
Utility Body Co 1530 Wood St Oakland 7 Calif
Utility Service Co Inc 1620 13th St (P O Box 102) Racine Wis
Utility Transformer and Equipment Co 702 Lynn Ave Baraboo Wis
UTILIVUE—Diamond Power Specialty Corp
UVILUX—Burton Mfg Co

V

VCU—Guth (Edwin F) Co
VHS RELAY—Assembly Products Inc
V*S—Reliance Electric & Engineering Co
V V Fitting Co PO Box 1253 Merchantville NJ
VAC-IT—Doyle Vacuum Cleaner Co
VAC-KING—American Floor Machine Co
VAC-ON—Hypro Engineering Inc
VAC-U-SEL—General Electric Co
VACMOBILE—Pullman Vacuum Cleaner Corp
Vaco Products Co 317 E Ontario St Chicago 11 Ill
VACU-BREAK—BullDog Electric Products Div
Vacuum Tube Products Co Inc 2020 Short St Oceanside Calif
VALIMITOR—Electric Controller & Mfg Co
Valley Fan Mfg Co Box 206 Fort Valley Ga
VALV-AMP—General Electric Co
Van Cleef Bros Inc—see Dutch Brand Div
Van Cleef Div Johns-Manville Co—see Dutch Brand Div
Van Dyke Div—see AOW Corp
VANO—Coppus Engineering Corp
VAP-OIL-TITE—Ideal Industries Inc
VAPOR LUX—Luxor Lighting Products Inc
VAPOR-TEMP—Blue M Electric Co
VAPORMASTER—Crouse-Hinds Co
VAPROTEX—Woodhead (Daniel) Co
VARBAND—Varflex Corp
VAREPACK—Electric Products Co
VAREX—Ohio Brass Co
VARFIL—Varflex Corp
Varflex Corp 508 W Court St Rome NY
VARFLO—Varflex Corp
VARGLAS—Varflex Corp
VARI-AMP—Allis-Chalmers Mfg Co
VARI-ANGLE—Weksler Instrument Corp
VARI-FEED—Trico Fuse Mfg Co
VARI-SPEED—Reeves Pulley Co
VARI-SPOT—Curtis Lighting Div
VARIAC—General Radio Co
VARICELL—Superior Electric Co
VARIDOT—Simpson Electric Co
VARIDYNE—U S Electrical Motors Inc
VARIFORM—Lighting Products Inc
VARILUX—Major Equipment Co Inc
VARISTAT—Ward Leonard Electric Co
VARITAP—Burndy Corp
VARY-TALLY—Veeder-Root Inc
VASCO—Mitchell Industries Inc
VAULTMASTER—Haertel (Walter) Co
VECTO-RAY—Swan Mfg Co
Veeder-Root Inc 70 Sargeant St Hartford 2 Conn
VEEDRUM—Art Metal Co
Velocity Power Tool Company—see Mine Safety Appliances Company
VELOMETER—Illinois Testing Laboratories Inc
Velotron Inc 1186 Broadway New York 1 NY
VELVALUME—Day-Brite Lighting Inc
Vermaline Products Co PO Box 222 Hawthorne New Jersey
VENTAIR—Coppus Engineering Corp
VENTILATOR—Active Specialty Corp
Ventrola Mfg Co 501 S Chestnut St Owosso Mich
VENTURA—American-Standard
VENTURAFIN—American-Standard
VENTURIFLO—General Control Co
Verd-A-Ray Corp—see Penetray Corp
VERIBEST—Snyder (M L) & Son Inc
VERITELL—West Instrument Corp
VERSA—Versen (Kurt) Co
VERSA GROOVE—Anderson Electric Corp
Versabar Corp 14 Whyte St Jersey City NJ
VERSAL—Versen (Kurt) Co
VERSALINE—Miller Co
VERSATOL GEOPRENE—General Electric Co Wire & Cable Dept
VERSATER—Versen (Kurt) Co
VERSATIL—Versen (Kurt) Co
VERSATROL—Assembly Products Inc
VERSATRY—Versen (Kurt) Co
Versen (Kurt) Co 4 Slocum Ave Englewood NJ
VERSIL—Versen (Kurt) Co
VERSILIER—Keystone Electric Mfg Co
VERSITAP—Burndy Corp
VERSTRUM—Versen (Kurt) Co
VERTICON—Art Metal Co
VERTIDRUM—Art Metal Co
VERTOLITE—Line Material Industries
VI-TITE—Penn-Union Electric Corp
VIBRAPACK—Mallory (P R) & Co Inc
Vibrascope Co P O Box 97 Glenford NY
VIBRATONE—Federal Sign & Signal Corp
VIBRO—Burgess Vibrocrafters
VIBROGROUND—Associated Research Inc
VIBROTEST—Associated Research Inc
Vickers Inc Electric Products Div 1847 Locust St St Louis 3 Mo
VICON—Insul-8-Corp
VICORAY—Whitaker (Douglas C) Co Inc
VICTOR—Ludlow Mfg & Sales Co
Victor Electric Wire & Cable Corp 618 Main St West Warwick RI
Victor Instrument Mfg Co Inc 33 W 60 St New York 23 NY
Victor Insulators Inc—see I-T-E Circuit Breaker Co
VICTOR JR—Trine Mfg Corp
Victor Specialties 775 Main St New Rochelle NY
VICTOR SR—Trine Mfg Corp
Victor Ventilator Co—see Victor Ventilator Div
Victor Ventilator Div Philip Carey Mfg Co Middletown Ohio
VIEW TALK—Simpson (Mark) Mfg Co Inc
VIEWLITER—Duro-Test Corp
VIGILTROL—Automatic Control Co
VIKING—Forsberg Mfg Co
VIKING—Mid-States Welder Mfg Co
Viking Air Products 5601 Walworth Ave Cleveland 2 Ohio
Viking Instruments Inc East Haddam Conn
Vimco Mfg Co Inc Main St Holland NY
VIMCOLIGHT—Vimco Mfg Co Inc
VINSOL—Rusgreen Mfg Co
Virden (John C) Co 5009-6103 Longfellow Ave Cleveland 3 Ohio
VIS-A-RAY—Duro Test Corp
VIS-O-GLOW—Brach Mfg Co
VIS-O-MATIC—Co-operative Utilities Co Inc
VISA-VOLT—Advance Transformer Co
VISAFLAME—Mercoid Corp
VISICALL—Sperti Faraday Inc
VISION-AID—Amplex Corp
VISIONAIRE—Silvray Lighting Inc
VISIONAIRE—Sunbeam Lighting Co
VISITRON—Curtis Lighting Div
VISORLITE—Jay Lighting Mfg Co Inc
VISTALITE—Steber Mfg Co
VISUALIER—Garcy Lighting Div
VISUALITE—Magni Flood Inc
VISULARM—Crouse-Hinds Co
VITALITE—Adjustable Fixture Co
VITALOY—Billings & Spencer Co
VITREOSIL—Thermal American Fused Quartz Co

VITROHM—Ward Leonard Electric Co
VITROLAIN—Star Porcelain Co
VITRONAMEL—Anaconda Wire & Cable Co
VITROTEX—Anaconda Wire & Cable Co
VIZ-AID—Day-Brite Lighting Inc
VOGUE-LITE—Swivelier Co Inc
Voigt Co 1636 N Carlisle St Phila 21 Pa
VOKALCALL—Auth Electric Co Inc
VOLSEAL—Johns-Manville
VOLTBOX—Superior Electric Co
VOLTEST—Davenport Mfg Co
VOLTINE—Waveland Electric Co
VOLTMASTER—Pioneer Gen-E-Motor Co
VOLTROL—Acme Electric Corp
VON—Hewson Co Inc
VORNADO—Sutton (O A) Corp
VOYAGER—Swivelier Co Inc
VOYCALL—Lake Mfg Co
VU-ALL—Cable Electric Products Inc
VULCAN—Williams (J H) & Co
Vulcan Electric Co 88 Holten St Danvers Mass
Vulcan Radiator Co 775 Capitol Ave Hartford 6 Conn
VULCAN TRIMLINE—Vulcan Radiator Co
VULKENE—General Electric Co—Wire & Cable Dept
VYCOR—Corning Glass Works

W

W B—Ware Fuse Corp
WGR—Roller (Wm G) Inc
W & T—Wallace & Tiernan Inc
Waage Electric Inc 720 Colfax Ave Kenilworth NJ
Wac Engineering Co—see Wac Line Inc
Wac Line Inc 35 S St Clair St Dayton 2 Ohio
WAC-TAC—Wac Line Inc
Wachs (E H) Co 1525 N Dayton St Chicago 22 Ill
Waco Mfg Co—see Waco-Porter Corp
Waco-Porter Corp 3565 Wooddale Ave Minneapolis 16 Minn
Wadsworth Electric Mfg Co Inc 20-34 W 11th St (Box 272) Covington Ky
WAFER—Keystone Electric Mfg Co
WAGENSELLER—Acme Mfg & Gasket Co
Wagner Electric Corp 6400 Plymouth Ave St Louis 33 Mo
Wagner Malleable Products Co 222 W Adams St Chicago 6 Ill
Wagner Mfg Co Inc—see Lenco Inc
Wahlund (M Paul) Mechanical Laboratory P O Box 16 Grant Iowa
Wakefield Co 731 S Water St Vermilion Ohio
Wakefield Brass Co—see Wakefield Co
Walco Electric Co 131 Blackstone St Providence 1 RI
Waldman (John J) Co 477 Atlantic Ave Brooklyn 17 NY
Walker Brothers End St Conshohocken Pa
Walker Div Norma-Hoffmann Bearings Corp Stamford Conn
WALKERDUCT—Walker Brothers
WALKERFLEX—Walker Brothers
WALKERINE—Walker Brothers
WALKERPRENE—Walker Brothers
WALKERSYN—Walker Brothers
WALKERZONE—Walker Brothers
WALKIE-WORKLIFTER—Economy Engineering Co
Walkirt Co 141 W Hazel St Inglewood 3 Calif
Wall (P) Mfg Co P O Box 71 Grove City Pa
WALL FIN—Trane Co
WALL LINE—Trane Co
Wallace & Tiernan Inc 25 Main St Belleville NJ
WALLENS—Art Metal Co
WALLGRIP—Star Expansion
WALLOY—Wall (P) Mfg Co
WALLURNLITE—Gruber Bros Inc
WALLY—Holub Industries Inc
Walser Automatic Timer Corp 420 Lexington Ave New York 17 NY
Walton Laboratories Inc 1186 Grove St Irvington 11 NJ
Wama Co Industrial Bldg Baltimore 2 Md
Ward Leonard Electric Co 28 South St Mount Vernon NY
Ware Bros—see Ware Fuse Corp
Ware Fuse Corp 4400 W Lake St Chicago 24 Ill
WAREHOUSER—Yale & Towne Mfg Co
Warner Electric Brake & Clutch Co Beloit Wis
Warren Lamp Co—see Solar Electric Co
Warrick (Chas F) Co 1964 W Eleven Mile Rd Berkley Mich
WARWICK—Hayden Twist Drill Co
Washington Aluminum Co Inc Knecht Ave Pennsylvania RR Baltimore 29 Md
WATCH DOG—General Electric Co
WATCHMASTER—Carpenter Mfg Co
Waterman Products Co Inc 2445-63 Emerald St Phila 25 Pa
WATERSEAL—Thomas & Betts Co
WATERTITE—Okonite Co
WATERTITE—Woodhead (Daniel) Co
Watlow Electric Mfg Co 1376 Ferguson Ave St Louis 14 Mo
Watteredge Co 19629 West Lake Rd Rocky River 16 Ohio
Waukesha Motor Co Waukesha Wis
Waveland Electric Co 5542 N Ashland Ave Chicago 40 Ill
WEATHER DUTY—Westinghouse Electric Corp Lamp Div
WEATHERLOC—Continental Electric Equipment Co
WEATHERMAKER—Carrier Corp
WEATHERMASTER—Carrier Corp
WEATHERMASTER—Steber Mfg Co
WEATHERTRON—General Electric Co
Weaver (J A) Co 2110 Howard St St Louis 6 Mo
Webb Electric Mfg Co 1701 S W Jefferson St Portland 1 Ore
Webster Electric Co 1900 Clark St Racine Wis
WEBSTER SOUND—Webster Electric Co
WEDGE-GRIP—Sherman (H B) Mfg Co
WEDGE-ON—Thomas & Betts Co
WEDGE-TITE—Kearney (James R) Corp
WEDGELOCK—Adalet Mfg Co
WEDGIE—Insulation Mfrs Corp
WEDGTITE—Crouse-Hinds Co
WEED KUTTER—International Electric Fence Co Inc
Weiss and Biheller Merchandise Corp 584 Broadway NY 12 NY
WEJ-IT—Kirei Inc
Wej-Lock Mfg Co—see Grip-Tite Mfg Co
Weksler Instrument Corp 195 E Merrick Rd Freeport LI NY
Weksler Thermometer Corp—see Weksler Instrument
Welbilt Corp 57-18 Flushing Ave Maspeth 78 LI NY
Welch Mfg Co—see Raydyne Corp
WELCOME-LIGHT—Calumet Plastics Inc
Welcraft Products Co Inc—see Easy Heat Inc
WELDANPOWER—Lincoln Electric Co
WELDFORGED—Kerrigan Iron Works Co
WELDMASTER—Lewis-Shepard Products Inc
WELDOX—Hardman (H V) Co Inc
WELDPOWER—Raytheon Mfg Co
Welduction Corp 19400 W Eight Mile Rd (P O Box 146) Southfield Mich
Weller Electric Corp 601 Stone's Crossing Rd Easton Pa
Weller Mfg Co—see Weller Electric Corp
Wellington Machine Co 133 De Wolf St Wellington Ohio
Wells Mfg Corp 250 Service Rd Three Rivers Mich
WELLSAW—Wells Mfg Corp
WELTRONARCH—Weltronic Co
WELTRONARC—Welduction Corp
Weltronic Co 19500 W Eight Mile Rd Detroit 41 Mich
Weltronic Induction Heating Corp—see Welduction Corp
Wen Products Inc 5808 Northwest Highway Chicago 31 Ill
Werner Co (R B) Inc P O Box 580 Greenville Pa
WESCO—Westinghouse Electric Supply Co
Wesix Electric Heater Co 390 First St San Francisco 5 Calif
West Instrument Corp 4363 W Montrose Ave Chicago 41 Ill
West Wind Corp 1800 Airport Way Seattle 4 Wash
Westchester Brickote Products Co Inc 1528 Williamsbridge Rd NY 61 NY
Western Electro-Mechanical Co Inc 300 Broadway Oakland 7 Calif
Western Gear Corp Electro Products Div 132 W Colorado St Pasadena 1 Calif
Western Insulated Wire Co 2425 E 30th St Los Angeles 58 Calif
Western Plastics Corp 1515 W Second St Hastings Neb
Western States Equipment Company—see Lightonics
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa
Westinghouse Electric Corp Lamp Div Bloomfield NJ
Westinghouse Electric Corp Lighting Div 1216 W 58th St (P O Drawer 5817) Cleveland 1 Ohio
Westinghouse Electric Corp Standard Control Div Beaver Pa
Westinghouse Electric Corp Sturtevant Div Damon St Hyde Park Boston 36 Mass
Westinghouse Electric Supply Co 3 Gateway Center (Box 448) Pittsburgh 30 Pa
Westline Products Div Western Lithograph Co 600 E Second St Los Angeles 54 Calif
WESTON—Round (David) & Son Inc
Weston Instrument Div—see Daystrom Inc
WETOIL—Farrelloy Co
WEYCO—Young Electric & Mfg Co Inc
WHEAT—Koehler Mfg Co
Wheat Laboratories—see Koehler Mfg Co
Wheatland Electric Products Co 7308 Church Ave Pittsburgh 2 Pa
WHEEL-ABOUT—Rich (Phil) Fan Mfg Co Inc
Wheeler Electronic Corp 150 E Aurora St Waterbury 20 Conn
Wheeler Insulated Wire Co—see Wheeler Electronic Corp
Wheeler Mfg Co Ross Rd Ashtabula Ohio
Wheeler Reflector Co 275 Congress St Boston 10 Mass
Wheelock Signals Inc Branchport Ave Long Branch NJ
WHIRLCLAD—Polymer Corp
WHIRLPOOL—Standard Electric Mfg Co Inc
Whirlpool Corp St Joseph Mich
Whirlpool-Seeger Corp—see Whirlpool Corp
Whitaker (Douglas C) Co Inc 141 E Glenside Ave Glenside Pa
Whitaker Reel Mfg Co 3704 Jackson St (PO Box 1318) Monroe La
White (O C) Sales Co 40 Green St Marblehead Mass
White-Rodgers Co 1209 Cass Ave St Louis 6 Mo
Whitman & Barnes Div United Drill and Tool Corp 40600 Plymouth Rd Plymouth Mich
Whitney Blake Co 102 Pershing St New Haven 14 Conn
WHIZ—Crown Industrial Products Co
WHIZ—Speedex Mfg Co
WICK-O-LITE—North American Electric Lamp Co
WIDE-SPREAD—Holophane Co Inc
WIDE-VUE—Simpson Electric Co
Wiegand (Edwin L) Co 7637 Thomas Blvd Pittsburgh 8 Pa
WIFE-SAVER—Simpson (Mark) Mfg Co Inc
WIL-GARD—Wilson Rubber Co
Wil-Son Mfg Co Cloverport Ky
Wilbur & Williams Co Inc 650 Pleasant St Norwood Mass
Wilde Drop Forge & Tool Co—see Wilde Tool Co Inc
Wilde Tool Co Inc Hiawatha Kans
Wilder Mfg Co Inc Mechanic St E Erie Railroad Port Jervis NY
Wiley Displays Inc—see Wiley (R & W) Inc
Wiley (R & W) Inc Dearborn & Bridge St Buffalo 7 NY
Wilkoff (M J) Co 823 Locust Pittsburgh 19 Pa
Willard Storage Battery Co—see Willard Storage Battery Div
Willard Storage Battery Div Electric Storage Battery Co 246-286 E 131 St Cleveland 8 Ohio
Williams (J H) & Co 400 Vulcan St Buffalo 7 NY
Williams (Hugh B) Mfg Co 8330 Lovett St (P O Box 7815) Dallas Tex
Williams (H E) Products Co 106 S Main St Carthage Mo
Wilmington Fibre Specialty Co New Castle Dela
Wilmot Castle Co 1928 E Henrietta Rd Rochester NY
Wilson (G C) & Co 1915 Eighth Ave Huntington W Va
Wilson (J A) Lighting & Display Inc 1502 Industrial Dr Erie Pa
Wilson Rubber Co 1200 Garfield Ave S W Canton 6 Ohio
Wincharger Corp E Seventh & Division St Sioux City 2 Iowa
WINCO—Wincharger Corp
WIND-ELECTRIC—Hirschman-Pohie Co Inc
WIND-O-VENT—Reed Unit-Fans Inc
Wind-Way Fan & Ventilator Co 531 St Joseph St New Orleans 12 La
WINDMAKER—Rich (Phil) Fan Mfg Co Inc
WINDOLITE—Light & Power Utilities Corp
WINDOW WONDER—Rich (Phil) Fan Mfg Co Inc
WING-DING—Diamond Expansion Bolt Co Inc
Wing (L J) Mfg Co 303 N Stiles St Linden NJ
WING-NUT—Ideal Industries Inc
WINGFOIL—Wing (L J) Mfg Co
WINGJET—Wing (L J) Mfg Co
Winpower Mfg Co Newton Iowa
Winterburn Mfg Co P O Box 386 Putnam Conn
WIRE GLIDE—Electrical Fittings Corp
WIRE-LESS-COM—Simpson (Mark) Mfg Co Inc
WIRE-LUBE—Ideal Industries Inc
WIRE MIKE—Burndy Corp
WIRE-NUTS—Ideal Industries Inc
WIRE WATT—Ohmite Mfg Co
WIRED HEAT—Wesix Electric Heater Co
WIREDUCT—Wiremold Co
WIRELESSFONE—Simpson (Mark) Mfg Co Inc
WIRELESSTALK—Simpson (Mark) Mfg Co Inc
WIREMASTER—Champion DeArment Tool Co
Wiremold Co Hartford 10 Conn
WIREWA—National Electric Div
WIREWRAP—Taylor Electric Inc
WISCEL—Wisconsin Electrical Mfg Co Inc
Wisconsin Carbon Corp—see Kirkwood Carbon Corp
Wisconsin Electrical Mfg Co Inc 1237 S Third St Milwaukee 4 Wis
Wisconsin Storage Battery Co—see Wisco Division
Wiss (J) & Sons Co 33 Littleton Ave Newark 7 NJ
WIZARD—General Control Co
Wodack Electric Tool Corp 4627 W Huron St Chicago 44 Ill
WOLMANIZED—Koppers Co Inc
WONDABAR—Virden (John C) Co
WONDER—American Pipe Bending Machine Co Inc
WONDERFLUX—American Silver Co Inc
WONDERLITE—Magni Flood Inc
Woodhead (Daniel) Co 15 N Jefferson St Chicago 6 Ill
Woodward Machine Co Lighting Div 4833 Elmhurst Detroit 4 Mich
WORK BULL—Massey-Ferguson Industrial Div
Work-O-Lite Co 522 Cortlandt St Belleville 9 NJ
Workrite Mfg Co 612-620 Colorado Ave Santa Monica Calif
WORKSAVER—Yale & Towne Mfg Co
Worthington Corp Worthington Ave Harrison NJ
WRAP-CAP—Ideal Industries Inc
WRAP-IT-HEAT—Acra Electric Corp
Wrap-On Co 341 W Superior St Chicago 10 Ill
WRIGHT CIRCUIT—Electric Controller & Mfg Co
Wright Hoist Div American Chain & Cable Co Inc Franklin & Hay Sts York Pa
Wrought Washer Mfg Co 2280 S Bay St Milwaukee 7 Wis
WYCO—Wyzenbeek & Staff Inc
WYTELINER—Guth (Edwin F) Co
Wyzenbeek & Staff Inc 223 N California Ave Chicago 12 Ill

X

XIT—Iona Ventilator Co Inc
XL—Excel Fuse Co
X-L—Henderson Electric Co
X-Ray Reflector Co—see Curtis Lighting Div
X-TRACT-O—Trico Fuse Mfg Co
X-VAR—Fidelity Chemical Products Corp
XCEL—Xcelite Inc
Xcelite Inc Thorne Ave at Bank St Orchard Park NY
XDUCT—National Electric Div H K Porter Co
XELON—Times Wire & Cable Co
XTENSIONDUCT—National Electric Div H K Porter Co

Y

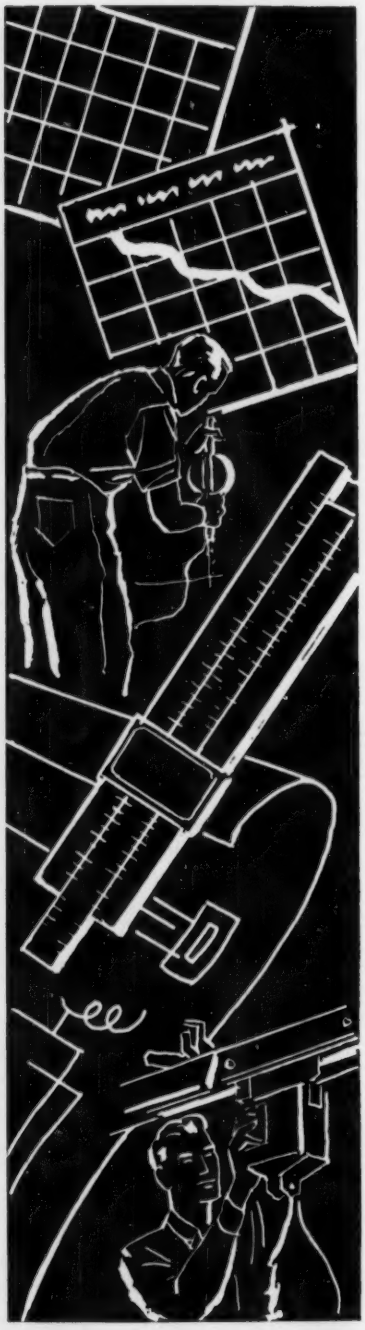
Y-ER-EAS—Electro Compound Co
YAK—Mercury Mfg Co
Yale & Towne Mfg Co 11000 Roosevelt Blvd Philadelphia 15 Pa
YAGER—Benson (Alexander R) Co Inc
YANK—Mercury Mfg Co
YARD LITE—Markel Electric Products Inc
Yardney Electric Corp 40-50 Leonard St New York 13 NY
Yardney International Corp—see Yardney Electric Corp
Yardney Laboratories Inc—see Yardney Electric Corp
Yeats Appliance Dolly Sales Co 2124 N 12th St Milwaukee 5 Wis
Yellow Springs Instrument Co Inc P O Box 106 Yellow Springs Ohio
Yokogawa Electric Works Inc 40 Worth St New York 13 NY
YOLOY—Youngstown Sheet & Tube Co
York Corp—see York Div
York Div Borg-Warner Corp Grantley Rd York Pa
York Ice Machinery Corp—see York Div
York Mfg Co—see York Div
YORKAIRE—York Div
Yorkville Metal Products Co 677 Broadway N Y 12 NY
Young Bros Co 1831 Columbus Rd Cleveland 13 Ohio
Young Electric & Mfg Co Inc 2134 Curtis Denver 2 Colo
Young Engine Corp P O Box 532 Canton Ohio
YOUNG MODERNS—Lightolier Inc
YOUNGSTOWN—Electric Controller & Mfg Co
Youngstown Sheet and Tube Co P O Box 900 Youngstown 1 Ohio
YUKON—Perfeclite Co

Z

ZAMPA—Weiss & Biheller Merchandise Corp
Zell-Aire Corp Orrton Ave Reading Pa
Zellers Laboratories Heating Div—See Zell-Aire Co
ZENITH—Scranton Storage Battery Corp
Zenith Electric Co 155 W Walton St Chicago 10 Ill
ZEPHAIR—Hunter Div
ZEPHYR—Chester Hoist Div
Zerhickow (O) Co 15 Park Row New York 38 NY
ZINC-SHIELD—Wilbur & Williams Co
Zinsco Electrical Products 729 Turner Los Angeles 12 Calif
Zinzeye Co—see Zinsco Electrical Products
ZIP SPOT—Mid-States Welder Mfg Co
ZIPBOOT—Zippertubing Co
ZIPCORD—Kaiser Aluminum & Chemical Sales Inc
ZIPPDUCT—Zippertubing Co
ZIPLITE—Kaiser Aluminum & Chemical Sales Inc
ZIPPER-ETTE—Mid-States Welder Mfg Co
ZIPPERTUBING—Illumitronic Engineering
Zippertubing Co 752 S San Pedro Los Angeles 14 Calif
ZIPPWRAP—Zippertubing Co
ZIPSOL—Fidelity Chemical Products Corp
ZONALARM—Edwards Co Inc
ZOREX—Adjustable Fixture Co

PRODUCT SELECTION DATA

Detailed information on electrical products



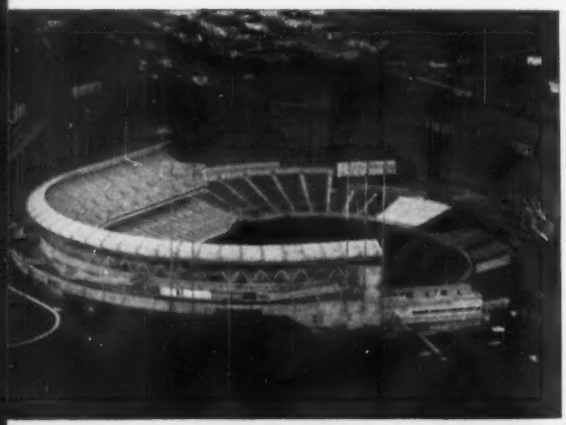
This section contains data presented by manufacturers of electrical apparatus and supplies, utilization equipment, components, tools and accessories. Descriptions include installation and application data, performance characteristics and specifications.

Bold-face type and the symbol (●) are used in the Product Directory to indicate the location of information on specific equipment in this section.

Planning for power puts 400 million candle power in Candlestick Park

YOU CAN BE SURE... IF IT'S Westinghouse

Detailed analysis of power requirements by a team of electrical experts produced a highly reliable, efficient distribution system that assures uninterrupted service throughout Candlestick Park. Checking system specifications: Spence Pors, Westinghouse Distributor Salesman; Electrical Contractor G. F. Brayer of Brayer Electric Company; C. L. Harney, General Contractor; L. E. Patton, Consulting Electrical Engineer; H. G. Dechene of Brayer Electric Company; and D. G. Hartman, Westinghouse Sales Engineer.



America's newest baseball arena, Candlestick Park, is Powered-Up for maximum nighttime "see-ability" and "playability" with 1147 Westinghouse Type VRC-20, 1500-watt floodlights mounted on eight towers, all approximately 200 feet high. A strikingly designed wind baffle tops the massive concrete stadium that blends well with the modern design of these lighting standards. The spun aluminum floodlight reflectors are mounted on swing-over brackets with automatic latch for maintenance ease. Under direction of Westinghouse Lighting Engineer Reed Hansen (photo right), all floodlights were spotted on the ground prior to erection of towers. This preplanning helped considerably in cutting installation cost.

J-94144-2

Electrical team Powers-Up Giants' new stadium for adequate, failure-free operation

San Francisco's Giants batted a 3 to 1 victory to inaugurate their bright new home in the West, Candlestick Park—one of the nation's finest, best-lighted baseball arenas.

To boost "seeability" and "playability" at night, 1147 1500-watt Westinghouse floodlights were installed, to furnish 400 million candle power for one of the best lighted stadiums in America. All floodlights were spotted on the ground, which saved on installation costs. And operation of all stadium lighting was made extremely convenient. A central panel controls field, seating, main corridor and parking lot lighting. Thorough consideration of the power requirements of other nighttime sports, like football, prompted provision for future expansion of the park's power system.

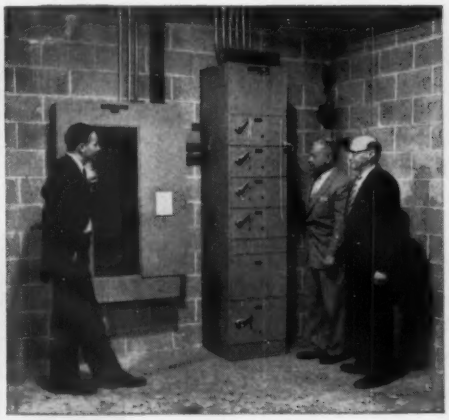
During the planning and erection of Candlestick Park, extensive consideration was given to its power requirements. The electrical contractor teamed up with the consulting electrical engineer, Westinghouse electrical distributor and engineers for close cooperation with the architect. Preplanning disclosed that eight Westinghouse power centers spaced around the stadium would provide the most economical, efficient method of distributing power for stadium lighting and other electrical equipment.

(cont.)

YOU CAN BE SURE...IF IT'S Westinghouse

J-94144-3

Economical power distribution for Candlestick Park was achieved with eight Westinghouse unitized power centers ranging from 750 kva to 225 kva, all with provision for expansion when required. Each power center steps 12-kv primary power down to 120/208 volts to serve lights and electrical equipment. Inspecting AB and DB feeder breakers are: M. P. Buswell, Westinghouse Area Sales Manager; C. L. Harney and L. E. Patton.



Motor control and protection is afforded by the Westinghouse motor control center under examination by J. R. Miller, Westinghouse Sales Engineer; Spence Pors and G. F. Brayer. This control center groups all motor controls together in interchangeable, space-saving, easily installed modular units. Breakers in CDP distribution panelboard at left protect against faults in the power circuits of mechanical equipment area of new stadium.

A 45-kva Type DT-3 dry-type transformer steps 120/208-volt, three-phase power up to 480 volts for parking lot lighting. Compact and maintenance-free, these lightweight transformers can be placed in most any out-of-the-way, nonpremium space. Candlestick Park's transformer, inspected by L. E. Patton and J. R. Miller, is located in a lamp storage area behind one of the eight power centers.

Electrical team Powers-Up Giants *(cont.)*

Westinghouse products were chosen for Candlestick Park for their ability to provide dependable, uninterrupted service. For information about how Westinghouse electrical equipment can meet your needs and help you Build Business Electrically—contact your nearest Westinghouse distribution outlet. Or write, Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania.

J-94144-4

OWNER: San Francisco Stadium Inc., for City and County of San Francisco

ARCHITECT-ENGINEER: John S. Bolles, San Francisco
E. Elmore Hutchison, San Francisco

CONSULTING ELECTRICAL ENGINEER: Lyle E. Patton, San Francisco

GENERAL CONTRACTOR: Chas. L. Harney, Inc., San Francisco

ELECTRICAL CONTRACTOR: Brayer Electric Co., San Francisco

WESTINGHOUSE DISTRIBUTOR: Westinghouse Electric Supply Co., San Francisco

YOU CAN BE SURE...IF IT'S Westinghouse

Reliable auxiliary equipment is found throughout Candlestick Park. *Above,* the control line-up contains a CAF-322, 240-volt, 60-amp fused safety switch; Class 11-206, Size 1 combination Life-Line® motor starter; and two Class 11-206, Size 2 combination Life-Line motor starters on one of which E. R. Reynolds, Job Foreman for Brayer Electric, makes an adjustment, and *below* he checks a Westinghouse 3-hp, Frame 213 Life-Line "A" compressor motor. Its open dripproof frame provides plus protection with openings facing down. High starting and breakdown torques inherent in compressor design of the Life-Line "A" motors assure adequate air supply.

Raco has the most versatile and complete line of roughing-in material you'll find anywhere. Shown here are some representative products of our extensive line. One thing is sure—whatever size, whatever type of box or fitting you require, Raco has it.

And, of course, when it comes to quality, anyone who has used Raco roughing-in materials will tell you, "there are none finer".

Write for new catalog on Raco fittings. No obligation, of course.

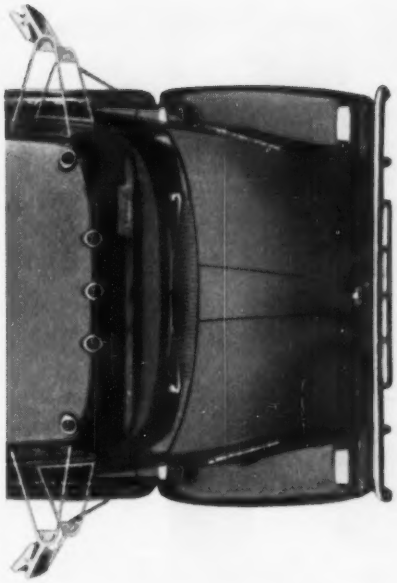
RACO

ALL-STEEL EQUIPMENT INC.

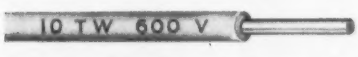
Aurora, Illinois

BEFORE YOU PICK UP ANOTHER FOOT OF WIRE, CABLE OR CONDUIT...

. . . can this QUICK ALCOA GUIDE help you do a better, more profitable job?



ALCOA ALUMINUM CONDUIT: Lightweight cost, heavyweight performance. Weighs about ⅓ as much as steel conduit. Cuts easier, threads easier, bends easier. Low first cost. Gives long-term performance because it resists corrosion and staining, is nontoxic, keeps its good appearance for years.



ROME BUILDING WIRE, TYPE TW: Resists heat, chemicals, flame, etc. Synthinol (thermoplastic) insulation gives you exceptional protection against heat, sunlight, oils, acids, alkalies, moisture, fire. Approved for wet or dry installations, up to 60°C. Available with either aluminum or copper conductor.

SERVICE ENTRANCE CABLE: Installs faster, looks neater. You can get Rome's Type SE-U service entrance cables in copper or aluminum. Their light weight, clean exterior and other extra advantages help you make each installation a fast, neat one. Approved for 75°C in dry or wet locations.

ROME POWER CABLES for low- and high-voltage jobs. Rome gives you a choice of aluminum or copper conductor, oil-base or butyl-base insulation, two kinds of jacketing. You get exactly the combination you need to resist weather, water, heat, cold, fire, abrasion, chemicals, oils, aging. *New stockpiling program at Rome Cable* lets you order 5kv and 15kv single-conductor cables in any length you need, for *immediate off-the-shelf delivery*.

MULTI-PURPOSE 600-VOLT CABLE for distribution and service entrance. Type RHW resists abrasion, flame, weathering, oil, moisture, most chemicals. Approved for conduit, underground duct and open wire installation, to 75°C. For direct earth burial the same quality of insulation of Type RHW is employed in Type USE.

NONMETALLIC SHEATHED CABLE: Multi-purpose, and resists corrosives. Rome's Flexall, Types UF and NMC, is approved as underground branch circuit and feeder cable. Copper conductor. Solves special problems such as between-building wiring in farm, industrial, residential projects, yard lighting, and interior wiring in barns, dairies, breweries, packing houses, cold storage and ice plants.

NEW STANDARD CONTROL CABLE: New savings, new versatility. Rome's new CT multi-purpose control cable puts you in the driver's seat. Rated for 600 volts—both AC and DC. Pick the number of conductors you need, from 2 to 37, in No. 10 or No. 12 AWG copper. Install it in open air, ducts, conduit, tray, trough, or buried in the ground. Goes in faster, makes neater installations because it is clean, lightweight, and smaller than rubber-insulated cables.

YOURS FREE: Fact-filled bulletins and other information on these products well be sent on request. No obligation, of course. Just contact your distributor, or write to: Rome Cable Division of Alcoa, Dept. ECP-90, Rome, New York.

ROME CABLE
DIVISION OF **ALCOA**

IT PAYS TO HAVE GOOD CONNECTIONS

HUBBELL

ONLY HUBBELL

. . . and in every size, type and rating

MIDGET Twist-Lock

The same high quality in midget size. Many O.E.M. uses. Wide selection of types and ratings.

10 a., 250 v. or 15 a., 125 v., A.C. or D. C.

7465 2-w. Cap
7464 2-w. Body
7466 2-w. Male Base
7485 3-w. Cap
7484 3-w. Body
7487 3-w. Female Base

REGULAR Twist-Lock

Rugged construction. Regular wiring. Wide range of types and ratings.

20 a., 250 v., A.C. or D.C. 10 a., 600 v., A.C.

7311 3-w. Armored Cap
7313 3-w. Armored Body
7327 3-w. Male Base
7328 3-w. Female Base
7310 3-w. Porcelain Receptacle

SUPER Twist-Lock

Screwless terminals and dead front for faster, safer wiring.

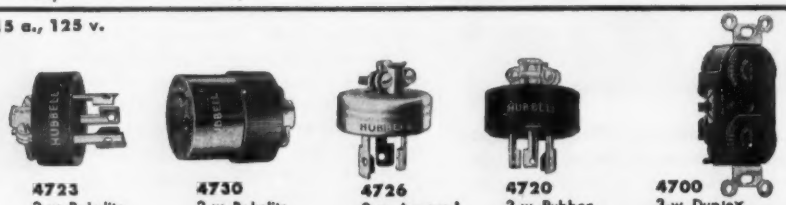
20 a., 250 v., A.C. or D.C. 10 a., 600 v., A.C.

3321 3-w. Armored Cap
3323 3-w. Armored Body
3325 3-w. Male Base
3326 3-w. Female Base

GROUNDING Twist-Lock

For 125 v. grounding only. Non-interchangeable with regular "Twist-Lock".

15 a., 125 v.



4723 3-w. Bakelite Cap
4730 3-w. Bakelite Body
4726 3-w. Armored Cap
4720 3-w. Rubber Cap
4700 3-w. Duplex Receptacle

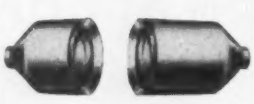
277 VOLT Twist-Lock

Non-interchangeable with other "Twist-Lock" or any other device made. Used for fluorescent lighting.

15 a., 277 v.

4776 3-w. Armored Cap
4780 3-w. Bakelite Body
4762 3-w. Single Receptacle, 1 15/16 strap
4760 3-w. Single Receptacle
4751 3-w. Duplex Receptacle, 4" cover

SEAL-TITE RUBBER COVERS



Now available for every Twist-Lock cap and connector body from 10 a. to 50 a. Protects devices from moisture, dust, dirt, oil, hard knocks, etc.

HARVEY

®Twist-Lock, Hubbellock, Insulprene, Chem Marine and Seal-Tite are registered trademarks of Harvey Hubbell, Inc.

MAKES Twist-Lock® WIRING DEVICES

to meet every building requirement

"INSULPRENE" Twist-Lock

Tough neoprene compound resists steam, hot water, grease, acids, etc.

30 AMP SUPER Twist-Lock

Non-interchangeable with 20 amp. units. Prevents interchange between 20 and 30 amp. service. Screwless terminals and dead front.

50 AMPERE Twist-Lock

In 600 v. A.C. and 250 v. D.C. Solderless connections. Metal cord grips.

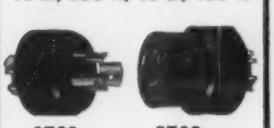
®CHEM MARINE Twist-Lock

Made from special materials that resist corrosive conditions. Unusually rugged. Distinctive yellow color.

5-WIRE SUPER Twist-Lock

For 4-wire applications requiring additional equipment ground.

3-WIRE
10 a., 250 v., 15 a., 125 v.

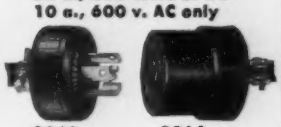


9782 3-w. Cap — **9780** 3-w. Body

2-WIRE
20 a., 250 v. AC or DC

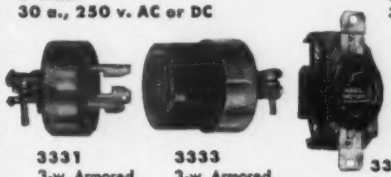
9770 2-w. Cap — **9768** 2-w. Body

3 and 4-WIRE
20 a., 250 v. AC or DC
10 a., 600 v. AC only



9960 3-w. Cap — **9966** 3-w. Body

3-WIRE
30 a., 250 v. AC or DC

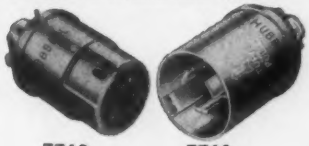


3331 3-w. Armored Cap — **3333** 3-w. Armored Body — **3330** 3-w. Single Rec.

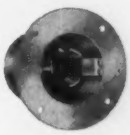
also available in complete 4-wire line;
30 a., 250 v. AC or DC, 30 a., 600 v. AC only.

3334 3-w. Male Base — **3335** 3-w. Female Base

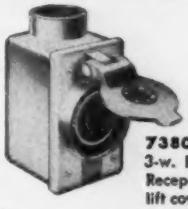
50 a., 600 v., A.C. 250 v., D.C.



7760 3-w. Female Armored Body — **7761** 3-w. Male Armored Cap

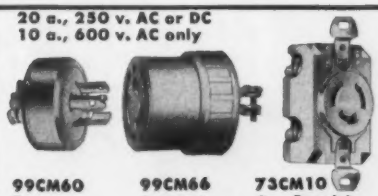


7960 3-w. Flush Male Motor Base



7380-82 3-w. Female Receptacle with lift cover plate

20 a., 250 v. AC or DC
10 a., 600 v. AC only



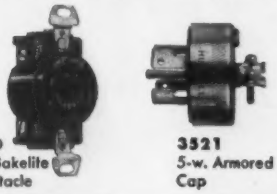
99CM60 3-w. Insulprene Cap — **99CM66** 3-w. Insulprene Body — **73CM10** 3-w. Porcelain Receptacle

88CM18 2-w. Male Base

48CM95 Closure Plug

74CM20 Metal Weatherproof Lift Cover Plate, shown with 73CM10 Receptacle, mounted to FS Box

20 a., 250 v. AC or DC 10 a., 600 v. AC only

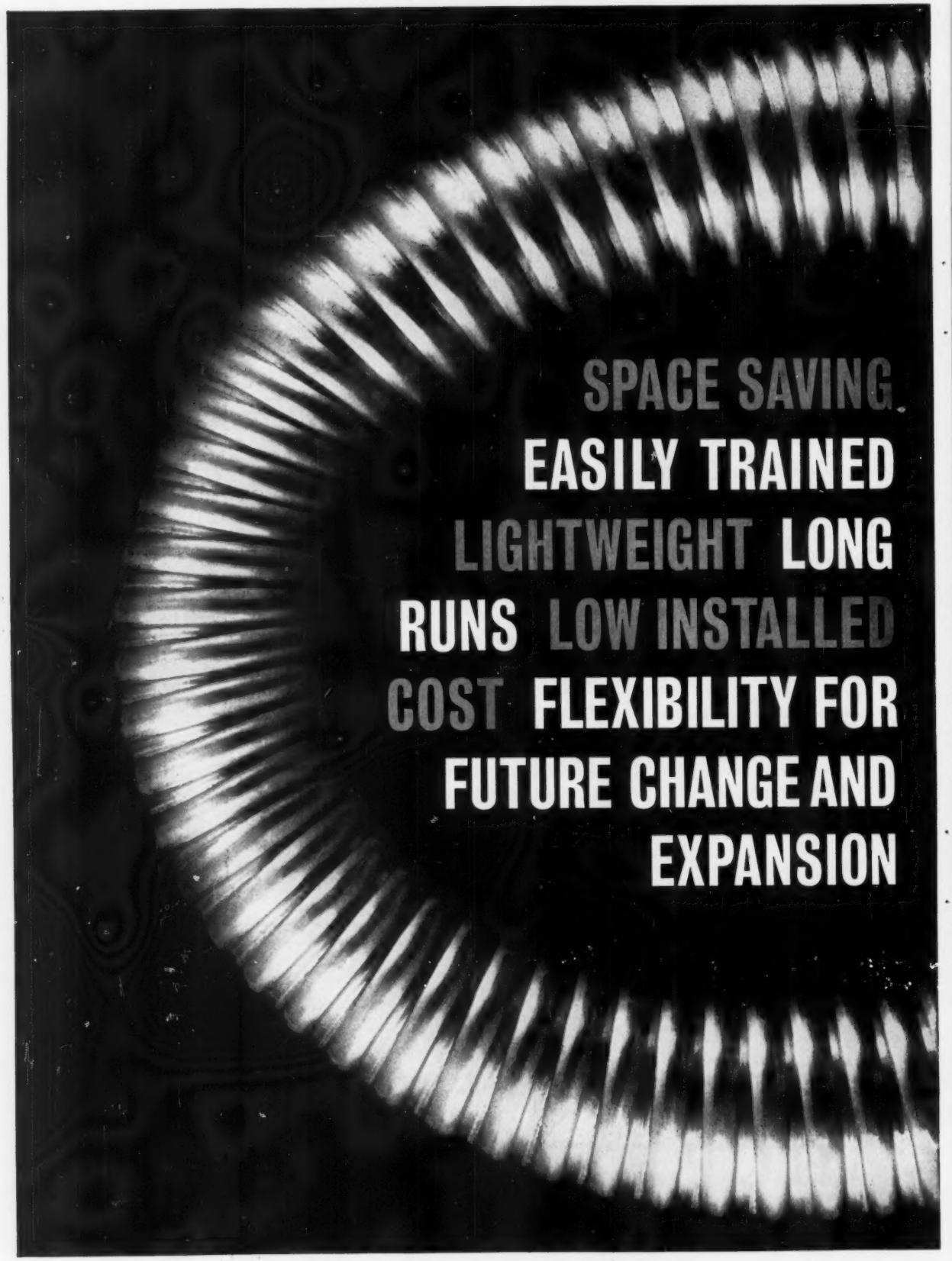


3320 5-w. Bakelite Receptacle — **3321** 5-w. Armored Cap

For complete information about Hubbell wiring devices check catalog No. 29 or refer to Sweet's File 31b/Hu. "Twist-Lock" configuration chart available on request.

HUBBELL, INCORPORATED

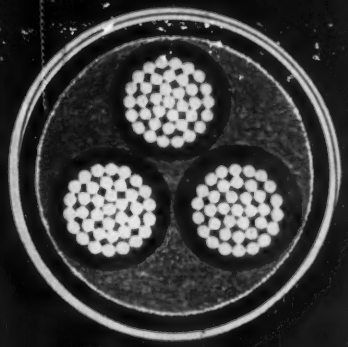
BRIDGEPORT 2, CONNECTICUT • IN CANADA: SCARBOROUGH, ONTARIO


SPACE SAVING
EASILY TRAINED
LIGHTWEIGHT LONG
RUNS LOW INSTALLED
COST FLEXIBILITY FOR
FUTURE CHANGE AND
EXPANSION

GENERAL CABLE

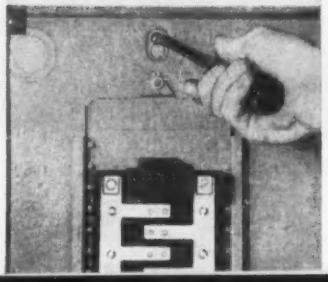
INTERLOCKED ARMORED CABLE

For full protection under all conditions install General Cable Interlocked Armor...the cable for power, control, communication and lighting systems. This compact, versatile cable is available in a wide range of constructions, insulations, armors and voltage ratings. Colored polyvinyl chloride jacket over the armor can be furnished where required. "How to Obtain the Greatest Advantage Per $ Spent" a comprehensive folder detailing General Cable's complete line of Interlocked Armored Cables is available upon request. **General Cable Corporation**, 730 Third Avenue, New York 17, New York. Offices and Distributing Centers Coast-to-Coast.

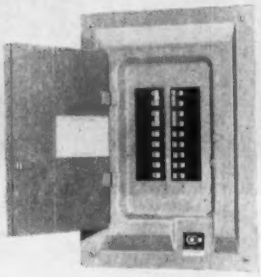


Won't corrode, won't rust. Every operating part either stainless steel or heavily plated for rust and corrosion resistance.

Easy to install. Plenty of wiring room. Box-type lugs on terminals. Meets non-interchangeability requirements. Easiest system of all to understand.



The only circuit breaker with modern styling, finished in neutral sandalwood, Cutler-Hammer Safetybreakers will blend with any decorative motif.



Double protection. Both a magnetic trip for short circuits and a bimetal trip for sustained overloads.

CONTROL

The new way to show how good your wiring job is

(it's the new Cutler-Hammer Safetybreaker, of course)

The smartly-styled load center that says quality without you having to say it. On your next wiring job, put Safetybreakers up near the kitchen where everybody can see them. The beautiful sandalwood finish blends with any decorating scheme, and you can probably save money on heavy-duty wiring runs.

But, the Safetybreaker's good looks aren't the only feature that distinguish it from the crowd. Due to its ingenious construction, it's the safest circuit protection you could install. That's why we call it the Safetybreaker.

End Needless Callbacks. You'll save money on callbacks, too, because there are only two easy-to-see positions of the Safetybreaker—"on" and "off". No tripped, mid-position to cause confusion on the part of the housewife. How many times have you been called to reset the breaker because the housewife didn't read the directions?

Space is too short to tell you all the wonderful features of the new Safetybreaker. Just see your Cutler-Hammer distributor and let him show it to you.

What's new in better service? Have you let your Cutler-Hammer distributor tell you about the new developments from Cutler-Hammer lately? New, better products. New distribution policies that keep your distributor in stock so you can have the part when you need it. More engineers to give you field help. The thing for you to do is ask a Cutler-Hammer distributor or representative, "What's new?" Then let him tell you.

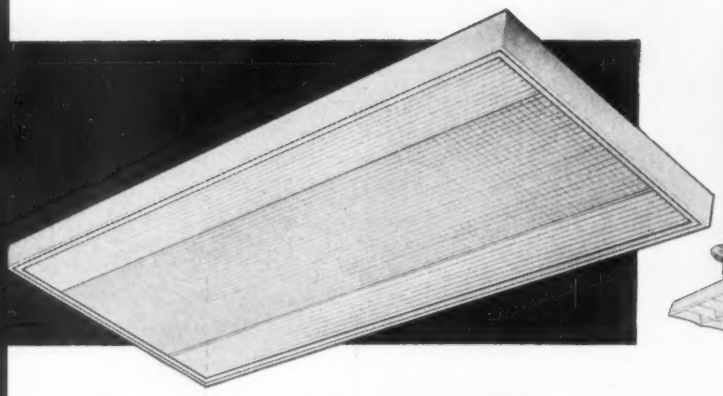
Free! 36-page new catalog for selecting the right size Safetybreaker. Ask for Pub. ED 125-S241.

WHAT'S NEW? ASK...

CUTLER-HAMMER

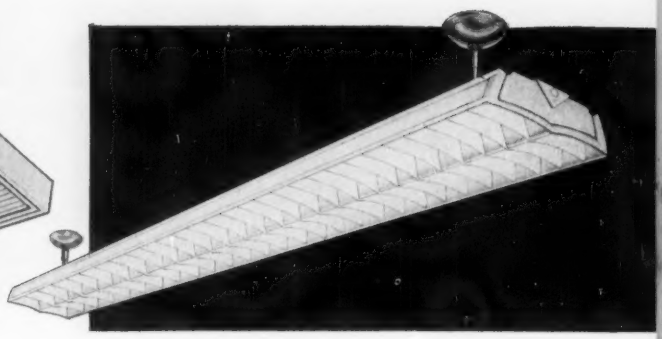
CONTROL

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.



HOW TO provide modern appearance plus surface-mounting flexibility:

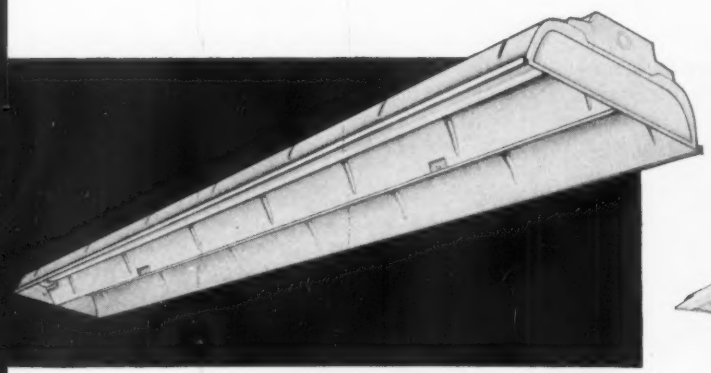
DAYLUME® Only 3¼ inches thin! Most complete line of surface lighting elements available today. 50 models, 5 enclosures, for extraordinary light control and layout possibilities.



HOW TO give schools and offices the best lighting for their money:

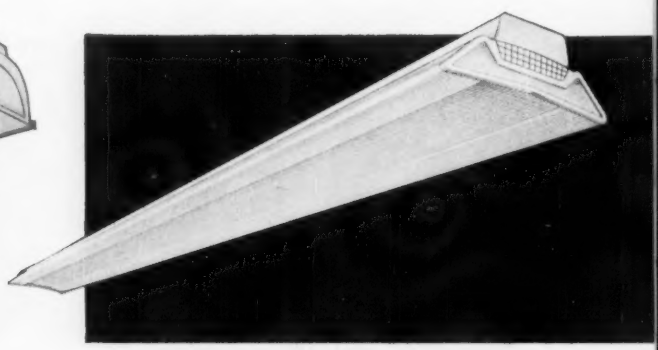
LUVEX® Here's solid value! Luvex goes up fast with "A-J" hangers. Baked white enamel finish and top relamping for easy maintenance. Plus over 80% efficiency.

How Day-Brite can help you



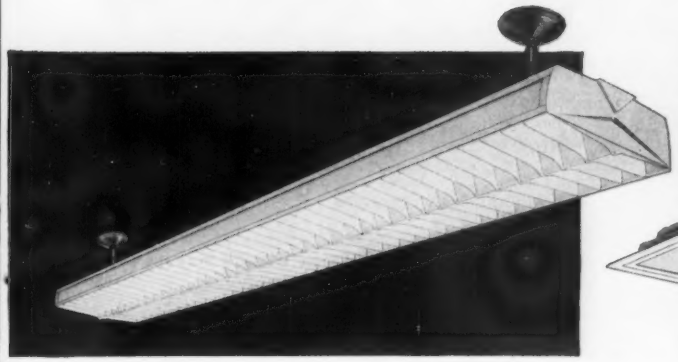
HOW TO create a glare-free environment where seeing tasks are critical:

CFI®-25 Day-Brite Comfort For Industry fixtures, with 8-foot Slimline or 4-foot Rapid-Start lamps, wipe out harsh ceiling contrasts—make plants look brighter, more cheerful.



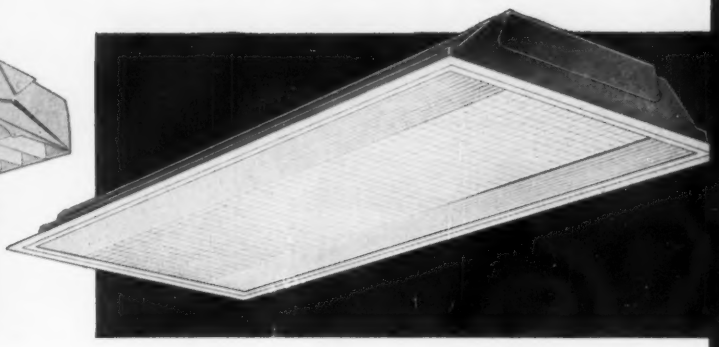
HOW TO get top lighting design and efficiency on a limited budget:

FAIRVIEW Day-Brite appearance, performance and quality at about half the price you'd expect to pay! First full 8-foot prismatic enclosure. For 8-foot Slimline or 4-foot Rapid-Start lamps.



HOW TO achieve more light with fewer fixtures:

POWER-GROOVE LUVEX® Day-Brite adds new versatility to this popular classic for use with extra high-output lamps. All metal fixture with louvers, die-formed and welded construction.



HOW TO offer modular flexibility and economy with unusual variety:

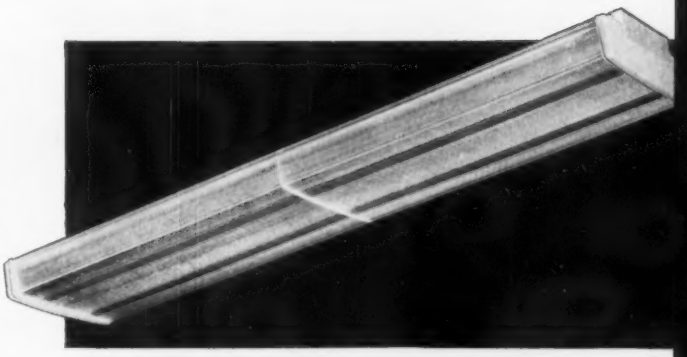
TROFFER and MOBILEX® Sturdy, shallow, lightweight expression of the modular concept for all types of ceilings. Choice of glass, plastic or louvered enclosures.

solve lighting problems

As the captions here indicate, Day-Brite fixtures are designed to solve specific problems.

That's why you're more likely to find the answers to your lighting problems in the Day-Brite line.

Next time a "puzzler" comes along, why not try your Day-Brite representative? You'll find him ready to work with you developing a practical solution. *Day-Brite Lighting, Inc., 6260 N. Broadway, St. Louis 15, Mo. and Santa Clara, Calif. In Canada: Amalgamated Electric Corp., Ltd. Toronto 6, Ont.*



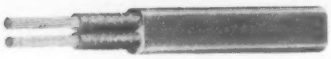
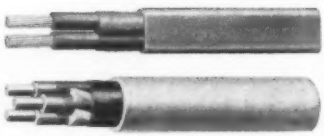
HOW TO reflect the ultimate in Day-Brite quality, prestige and performance:

HOLIDAY Day-Brite's finest for offices, stores and schools. Moulded acrylic plastic enclosures control light prismatically. An investment in lighting comfort and efficiency.

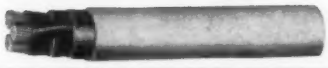
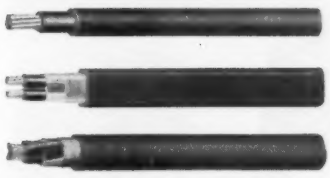
DAY-BRITE

NATION'S LARGEST MANUFACTURER OF
COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

Index of Phelps Dodge

Wires and Cables	Type Letter	Trade Name or Designation	Maximum Operating Temperature	USE
	ACV	Armo-Lok	85 C (185 F)	Dry Locations
	None	Armo-Lok	85 C (185 F) High Voltage	General Purpose: Consult manufacturer for specific applications
	W	Portable Power Cable	75 C (167 F)	Mining Machines, Dredges, Shovels, and similar portable applications Pennsylvania Dept. of Mines Flame Resistance Approval P-114. U. S. Bureau of Mines Listing P-114-BM.
	G		Low Voltage	
	SHD		85 C (185 F) High Voltage	
	RHW	Flamestop Heat and Moisture Resistant	75 C (167 F)	Dry and Wet Locations
	RHH	Flamestop Heat-Resistant	90 C (194 F)	Dry Locations
	RHL	Heat Resistant Rubber Lead	75 C (167 F)	Wet Locations and other Special Conditions
	NM	PD-X Nonmetallic-Sheathed Cable	60 C (140 F)	For Wiring Houses, Rural Buildings, Small Stores, and Shops.
	UF	Perma-Dure Nonmetallic-Sheathed Cable	60 C (140 F)	UF: Underground Feeder and Branch Circuit Cable for Direct Burial. NMC: For Interior Wiring in Moist or Corrosive Locations.
	UF-NMC			
	THW	Habirdure Thermoplastic insulated	75 C (167 F)	Dry and Wet Locations
	TW		60 C (140 F)	Dry and Wet Locations
	TF		60 C (140 F)	Fixture Wire
	None	Petro-Dure Thermoplastic Insulated Nylon Jacketed	60 C (140 F)	Moist locations and where exposed to mineral oil, liquid gasoline and gasoline vapor.
	None	Habirdure Machine Tool, Control, and Switchboard Wire	90C (194F) in air 80C (176F) in oil	Machine Tool, Control and Switchboard Wiring

Wires and Cables

Wires and Cables	Type Letter	Trade Name or Designation	Maximum Operating Temperature	USE
	TW	Habirdure (9T)	60 C as TW 90 C as Appliance Wiring	NEC Type TW Bldg. Wire—60°C Appliance Wiring—90°C in air or 60°C in water or oil
	None	Habirdure Appliance Wire	105 C (221 F) IN AIR 80 C (176 F) IN OIL	Appliance Wiring
	SE	Service Entrance Type SE — Style U Unarmored	75 C (167 F)	Service Entrance or Combination Service Drop & Service Entrance
	SD	Service Drop Type SD	60 C (140 F)	Service Drop
	USE	Service Entrance Type USE	75 C (167 F)	Underground Service Entrance, Direct Burial.
	V	Varnished Cloth Braided	85 C (185 F)	Dry locations only. Smaller than No. 6 by special permission.
	VL	Varnished Cloth Lead	85 C (185 F)	Wet or Dry locations. Smaller than No. 6 by special permission.
	None	Habirduct Habirprene	75 C (167 F) Low Voltage	General Purpose for Direct Burial, Aerial, Conduit and Underground Duct Installations.
		Habirite Habirprene	85 C (185 F) High Voltage	
	S or SO	Hard Service Cord	60 C (140 F)	Pendant or portable extra hard usage in damp locations; SO for oil resistance
	SJ or SJO	Junior Hard Service Cord	60 C (140 F)	Pendant or portable hard usage in damp locations; SJO for oil resistance
	SP	All Rubber Parallel Cord	60 C (140 F)	For use in pendant or portable applications in damp locations not subject to hard usage

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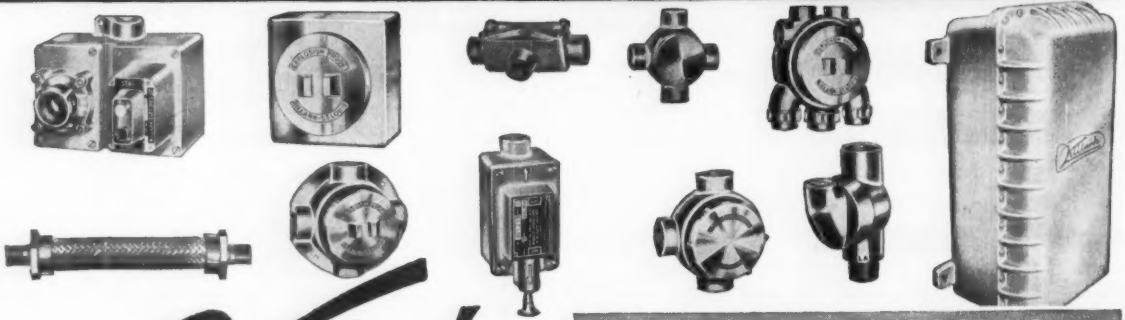
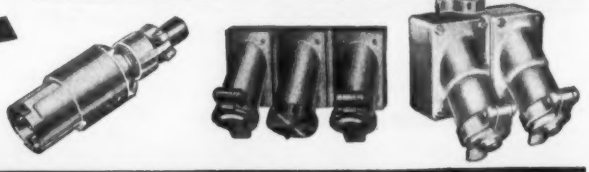
STANDARD LOCATIONS

EXPLOSION-PROOF FITTINGS



PLUGS & RECEPTACLES



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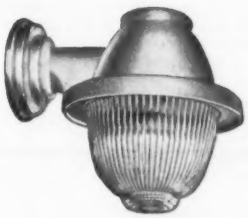
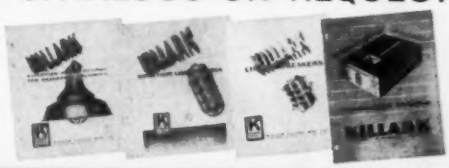
Dust-Tight

LIGHTING FIXTURES—SPECIAL LOCATIONS



CATALOGS ON REQUEST



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KILLARK ELECTRIC MFG. CO.
Vandeventer & Easton, St. Louis 13, Mo.
Gentlemen: Please send me following material:

- ☐ **Explosion-Proof Fittings Catalog No. 13**
- ☐ **Condensed Catalog No. 59**
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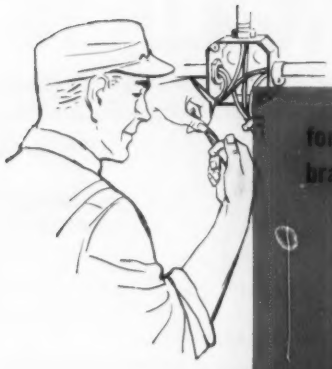
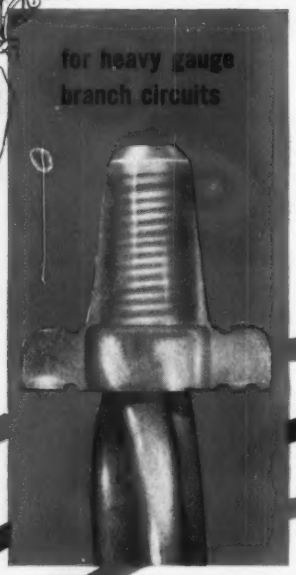


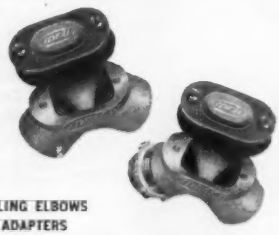


Wing-Nut

The newest! And just look at that grip! Say good-bye to sore thumbs and wrenches. Wing-Nut's built-in grip makes it a snap to splice even the hardest, heaviest branch circuit wires. New internal tension-spring coils hold splice with powerful "Python Grip". And you can see your splice is right, through the tough, semi-transparent Nylon shell. After splicing, you can clip off the wings for compact spaces. U. L. approved for aluminum-to-aluminum splices.

Wire-Nut®

The original! Every day, every year, more splices are made with Wire-Nuts than with any other connector. Economical, handy, easy to use. Wire-Nuts screw on easily, yet exert a tremendous grip that actually **crushes** wires together. All one piece, with rugged bakelite shell, it can't shake off. Five sizes for fixtures and branch circuits.



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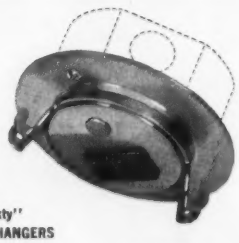
Make wiring around corners a snap. Quick and easy to use. ½" to 2" sizes. Precision machined of malleable iron for smooth pulling, perfect 90° fit. Cadmium plated, chromate treated. Sold assembled complete with domed covers, big screws, full neoprene gaskets. Sizes marked on covers and elbows.



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The **only** hanger with choice of 10 different receptacles. Full 360° adjustment after mounting—exclusive friction ring suspension rotates all the way around. Aligns fixtures instantly, with just a twist of the wrist. Permits hanging two or four chains, or S-hooks from small compact arms. Bright cadmium plated.

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Sleight-of-hand? No, not really. Yet thousands of contractors and electricians agree there almost *is* something magic about the way the IDEAL brand on a product makes any wiring job easier.

Take wire connectors, for instance. Some of you may remember about 30 years ago when Ideal introduced the *first* screw-on connector. Today's Wire-Nuts are even better, and are standard items in just about every electrician's pocket. And now the Ideal connector line includes the exciting new Wing-Nut, and the ever-popular Crimp and Wrap-Cap.

At every step along your job, Ideal offers a helping hand. There are super-flexible fish tapes with built-in pulling reels, precision wire strippers, cable rippers, pliers, wire lubricants, voltage testers . . . There's more; but we suggest you use the coupon below to get your own private copy of the new IDEAL CONTRACTOR-ELECTRICIAN CATALOG. Then you'll see for yourself the full meaning of the little red hand down in the coupon.

Wrap-Cap®

The favorite! Some electricians say there are certain splicing jobs a crimp does best. And here's the best crimp. A cadmium plated steel sleeve, and the one-and-only Wrap-Cap "diaper" insulator. Wrap-Cap goes on in a jiffy, clinging tightly around, under and **between** the spliced wires. Absolutely no better, easier, safer crimp connector available anywhere!

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The **only** completely re-usuable connector for use with liquid-tight, flexible metallic conduit. Provides absolute water and oil-tight seal — vapor, dust, grit cannot get through. Double positive seal — exterior and interior neoprene O-rings, meet JIC standards. Assembles quickly, easily. Absolutely won't pull apart. All parts can be reused over and over again. Standard design sizes ⅜" to 1½", 2½", 3", 4".

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OVER 75 YEARS EXPERIENCE

Insulated Wires and Cables

Pictured and described here are just a few of the many wires and cables that are made by CRESCENT.

ABC ARMORED CABLE

Has prefabricated breaking lines which make installing easier, quicker and safer. A flattened bonding wire in contact with the underside of each convolution of the armor assures a permanent low resistance of armor.

SYNTHOL BUILDING WIRE-TYPE THW

Rated for 75° C operation in both wet and dry locations. Its smaller diameter permits greater carrying capacity for rewiring conduits with overloaded feeders.

BUILDING WIRE—TYPE RHW

Braid or Neoprene covered

Highest quality insulation, for use in both WET and DRY locations at 75° C.

IMPERVEX TRENCHWIRE—TYPE USE-RR

Single conductors for direct earth burial. Has a heavy Neoprene jacket over the rubber insulation. Provides low cost, permanent underground cable installation.

STEEL TAPED PARKWAY CABLE

Designed for direct earth installation without additional protection. All standard types regularly supplied and special type cables made to customers' specifications.

IMPERIAL PORTABLE POWER CABLE

Illustration shows Type SH-D 5000 Volt Trailing Cable for supplying power to electric shovels, dredges, etc. Covered with extremely tough Neoprene jacket.

TYPE UF AND TYPE NMC

Used for direct earth burial as an underground feeder, also used for branch circuit wiring in damp or corrosive locations.

CRESFLEX

Most suitable, lowest cost for rural, residential and farm buildings. Clean, gray paint finish.

SERVICE CABLES—TYPE SE

Both Style A (armored) and Style U (unarmored) are approved by Underwriters' Laboratories as service entrance cable and may be run down the side of a building without additional protection. It is tamper-proof, flexible and lightweight, moisture-resistant and flame-retarding.

NEOPRENE CRESCORD

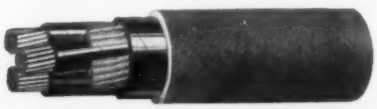
Heavy duty, oil-proof portable cord, Underwriters' Laboratories Type SO.

HYVOLT SHIELDED POWER CABLE

For use on power circuits from 5 to 15 KV in conduits or for direct burial.

INTERLOCKED ARMOR POWER CABLE

Provides a flexible, metal-enclosed method of wiring for power.



VARNISHED CAMBRIC LEAD ENCASED CABLE

Varnished cambric insulation has high dielectric strength and long life. Not affected by oils and greases. This cable is supplied with lead sheath for wet locations or weatherproof braid for dry locations.

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Best in show — on every point!

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How to select a Remote Control Switch

Electrical engineers are increasingly incorporating Remote Control Switches into their wiring layouts and circuits. Remotes today are used not only for the instantaneous control of emergency equipment, where they are a *must*, but for safety, economy and convenience wherever light or power is being distributed over a wide area.

Selection of Type

The selection of the right remote for a particular application must be given some study, but basically there are only two factors which affect the selection of type: (1) the class of load: non-inductive, such as heaters and lighting; or inductive, such as motors; (2) the voltages of the systems used.

Mixed Loads

Where there are mixed loads, non-inductive load rating must not be less than the combined full-load currents nor less than 66⅔% of the maximum current to be interrupted.

Any connected motors should be evaluated on the basis of stalled rotor current, using the multiplier of six times motor current if the actual value is not known. These currents added to the non-inductive load current will establish the maximum current which the switch will have to interrupt. In specifying the switch capacity, give class of the load and the amount of the load which is to be controlled.

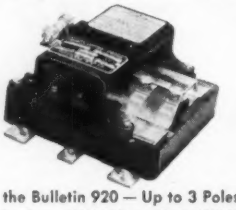
Why Mechanically Held

Another important selection-factor is that the remote control switch be mechanically held. Because it is essentially a feeder disconnect, the remote must be unaffected by line voltage conditions and respond only to control of the push buttons. ASCO mechanically held remotes insure against outages on vital circuits caused by momentary line voltage dips.

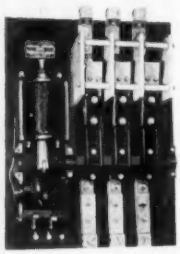
A detailed report on the advantages of ASCO remote control switches can be obtained by writing for new catalog 57-S2.

A selection of basic Remote Control Switches by ASCO

For Economy and Rugged Construction . . .



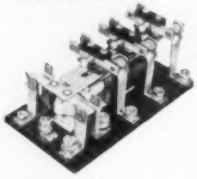
Use the Bulletin 920 — Up to 3 Poles, Single Throw, 30-75 Amps D-C, 30-200 Amps A-C. U.L. Approved to 600V A-C, 250V D-C. Recommended for all loads within its capacity range.



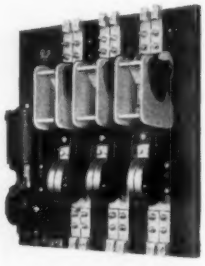
For Load Requirements Exceeding Capacity of the Bulletin 920 . . .

Use the Bulletin 910—Up to 4 Poles, Single Throw, 30-400 Amps, 250 volts, A-C.

For Small Panelboards . . .



Use the Bulletin 909 — Up to 5 Poles, Single Throw, 3 Poles, Double Throw, 30 Amps, 250 volts, A-C or D-C.

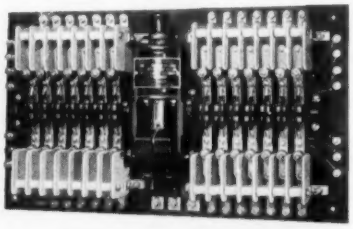


For High Capacity, Highly Inductive Loads . . .

Use the Bulletin 911—Up to 4 Poles, Single Throw, 30-1000 Amps, 600 volts, A-C, 250 volts, D-C.

For Multiple Pole Requirements . . .

Use the Bulletin 915—Up to 24 Poles, Single or Double Throw, 30, 60 and 100 Amps, A-C.



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Automatic Switch Co. HANOVER RD., FLORHAM PARK, N. J., FRONTIER 7-4600

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ASCO®

Simplex PRODUCTS GUIDE

SIMPLEX WIRE & CABLE CO., CAMBRIDGE 39, MASSACHUSETTS, U.S.A.

Simplex ANHYDREX Insulated Cables for Power transmission and Communication (like the Simplex TIREX Portable Cords and Cables shown in adjacent column), though manufactured as stock products, are custom designed to suit all service requirements. A large technical and engineering staff at Simplex' main plant is equipped to give you the benefits of their long experience in electrical cable planning.

ANHYDROPRENE — Simplex ANHYDROPRENE Cables are designed for economical installation in ducts, conduits, racks, trays and raceways. Stock sizes AWG 14 to 1000 MCM are recommended for 90 C service in WET or DRY locations. The words "Simplex ANHYDROPRENE" are either printed or molded plainly on the jackets of all ANHYDROPRENE cables. This marking signifies the traditionally high quality of a Simplex product.

CATALOGUE #1028

ANHYDREX-NEOPRENE — Simplex ANHYDREX-NEOPRENE Cables have the added mechanical protection of a heavy wall of neoprene jacketing. These cables are manufactured for use in aerial installations and for direct burial service. Stock sizes AWG 14 to 1000 MCM are recommended for 90 C service in WET or DRY locations.

CATALOGUE #1028

ANHYDREX-PLASTEX — Simplex ANHYDREX-PLASTEX (ANHYDREX-insulated, PLASTEX-jacketed) Cables are scientifically designed for compatibility between insulation and jacket, and for perfectly balanced performance in ducts, conduits, aerial and direct burial installations. ANHYDREX-PLASTEX Cables are recommended for service in a number of environments but especially where oils and chemicals are a problem.

CATALOGUE #1028

ANHYDREX Insulated Control Cables — Simplex ANHYDREX Control, Signal and Communication Cables have an additional thickness of appropriately coded neoprene over each individual conductor, plus heavy-duty neoprene jackets. ANHYDREX insulation provides excellent signal reproduction and is exceptionally stable, even when operating with high ambient temperatures.

CATALOGUE #1028

ANHYDREX XX — Simplex ANHYDREX XX is a butyl-based insulation of the highest possible quality. Because of its exceptional resistance to heat and ozone, it has general applications in circuits operating up to 35,000 volts, with permissible conductor temperatures of 90 C. to 5KV, and 85 C to 17KV — in wet or dry locations.

CATALOGUE #1023

CONDEX — Simplex CONDEX Cables are protected against mechanical damage by interlocked metallic armor. The armor is manufactured of galvanized steel, plain or baked enameled (colored) aluminum, bronze or other metals, and can be applied over any cable core within a very wide diameter range. CONDEX Cables may be further protected by a thermoplastic covering over or under the metallic armor.

CATALOGUE #1024

TIREX SO and SJO Cords — TIREX SO and SJO Cords are constructed to meet the most rigid specifications. All of their special features are carefully selected and processed to give maximum qualifications for portable service. They will twist without kinking, and bend without breaking. TIREX stranding affords maximum flexibility without sacrificing strength.

Conductor temperature rating 75c

CATALOGUE #992

TIREX Low Voltage Portable Cables — TIREX Low Voltage Cables are individually designed for specific applications. They are practically indestructible when used to do the work for which they are intended.

Conductor temperature rating 75c

CATALOGUES #992 & #1011

TIREX High Voltage Portable Cables — TIREX High Voltage Portable Cables have unequaled strength and versatility. Designed primarily to transmit energy to mobile electrical equipment, they are also used as temporary power lines during alterations or emergency repairs.

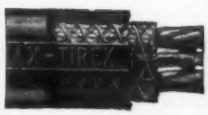
Conductor temperature rating 75c

CATALOGUE #1012

TIREX Mine Locomotive Cables — TIREX Mine Locomotive Cables — both single and two-conductor concentric — are approved by the Bureau of Mines and have the raised marking "P-101 BM" on their heavy-duty neoprene jackets. All TIREX Cables are cured and conditioned for service in lead.

Conductor temperature rating 75c

CATALOGUE #1011



TIREX Mining Machine and Shuttle Car Cables — TIREX Mining Machine and Shuttle Car Cables are designed for stability under today's rigorous mining conditions. The insulated conductors are "ribbed" or gear-shaped. This feature causes them to interlock with the heavy duty neoprene jacket and prevents them from slipping. Both Type W and Type G have "P-101 BM" molded onto the jacket.

Conductor temperature rating 75c

CATALOGUE #1011

TIREX Dredge and Shovel Cables — TIREX Dredge and Shovel Cables are masterpieces of engineering achievement. Every consideration has been given to safety and durability. Simplex special cured-in-lead neoprene armor effectively resists all the elements normally encountered in this type of work.

Conductor temperature rating 75c

CATALOGUE #1012

TIREX Welding Cables —TIREX Welding Cables are scientifically stranded for maximum flexibility without wrist drag. Cured-in-lead neoprene jackets provide utmost safety for both operator and bystanders.

Conductor temperature rating 75c

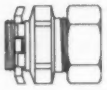
CATALOGUE #1011

NOW! ORDER ONCE, FOR THEM ALL, *FROM BLACKHAWK*

A COMPLETE **line of quality fittings — accessories, and specialties for electricians can be combined in one order from Blackhawk**

FITTINGS

Slip Fitter Head. Won't rust or discolor. Available for ½" through 4" conduit.



EMT Connector. Quick and easy to install. No corrosion. Complete range of sizes. Also available with insulated throat.

The 800 Series Service Entrance Elbow. Long lasting. Makes pulling wire through conduit easier.

540 One Piece Box Support. Provides rigid, unified support. Easy to install. The first and finest.

Service Entrance Cable Head. Heavy steel cable clamp. Large key hole.

Snap Strap for rigid conduit or EMT. Provides rigid contact support. Easy to install.

Adjustable Bar Hanger. Fast, neat, thrifty for hanging all ceiling light fixtures.

Beam Clamps. Complete with case-hardened set screw.

Conduit Hanger. Carriage bolt locks tighten with one tool. May also be used with stove bolt.

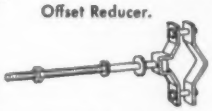
SERVICE ENTRANCE MAST ASSEMBLY & ACCESSORIES

Service Entrance Mast. Available for 1¼", 1½", 2", 2½" and 3" pipe.

Offset Reducer.

Slip Fitter Head.

Neoprene Synoflashing Unit.



Mounting Bracket. Fits all size pipe from 1¼" to 3".

Insulators.

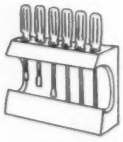
WIREHOLDERS

Heavy-duty Steel Clad Wireholder.

Medium-duty Steel Clad Wireholder.

Small Wireholder. 2" by 1⅜".

SPECIALTIES



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Steel and Brass Wood and Machine Screws and Tapping Screws.

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1901 Griffin Street

DENVER, COLORADO
Rocky Mtn. Electric Sales Co.
16 Wazoo Market

ELIZABETH, NEW JERSEY
R. L. Brown Associates
663 Pennsylvania Avenue

GREENSBORO, NORTH CAROLINA
Cary Chapman & Company
1009 S. Elm Street

HAMDEN, CONNECTICUT
Mills Talbot & Company
P. O. Box 4212

HIALEAH, FLORIDA
Cary Chapman & Company
301 E. 10th Avenue

HONOLULU 16, HAWAII
Mr. Harold D. Kroh
836 Ocean View Drive

KANSAS CITY 1, MISSOURI
Schooler-Gorman Company
1224 W. 9th Street

LOUISVILLE, KENTUCKY
Thomas W. Bullock Company
121 Breckinridge Lane
Colonial Building

LOS ANGELES, CALIFORNIA
Airelectric Incorporated
120 S. Hewitt Street

LOS ANGELES, CALIFORNIA
Earl S. Condon Co.
3450 Wilshire Blvd.

MILWAUKEE 13, WISCONSIN
Goehler and Adams
6033 W. Bluemound Road

MINNEAPOLIS, MINNESOTA
M. J. Pelletier
1015 N. Third Street

NEW ORLEANS, LOUISIANA
Cary Chapman & Company
213 S. Front Street

NEW YORK 7, NEW YORK
H. W. Emery & Company
30 Church Street

NEWTON 67, MASSACHUSETTS
Mr. William M. Selig
99 Waban Hill Road North

PHILADELPHIA 7, PENNSYLVANIA
W. A. Leiser & Company
1219 Race Street

PITTSBURGH 22, PENNSYLVANIA
Mr. Vincent P. Oatis, Jr.
Investment Bldg. — 4th Avenue

PORTLAND, OREGON
Bruce Emmett Company
830 S. E. Alder Street

ROCHESTER 8, NEW YORK
Mills Talbot & Company
1 Flint Street

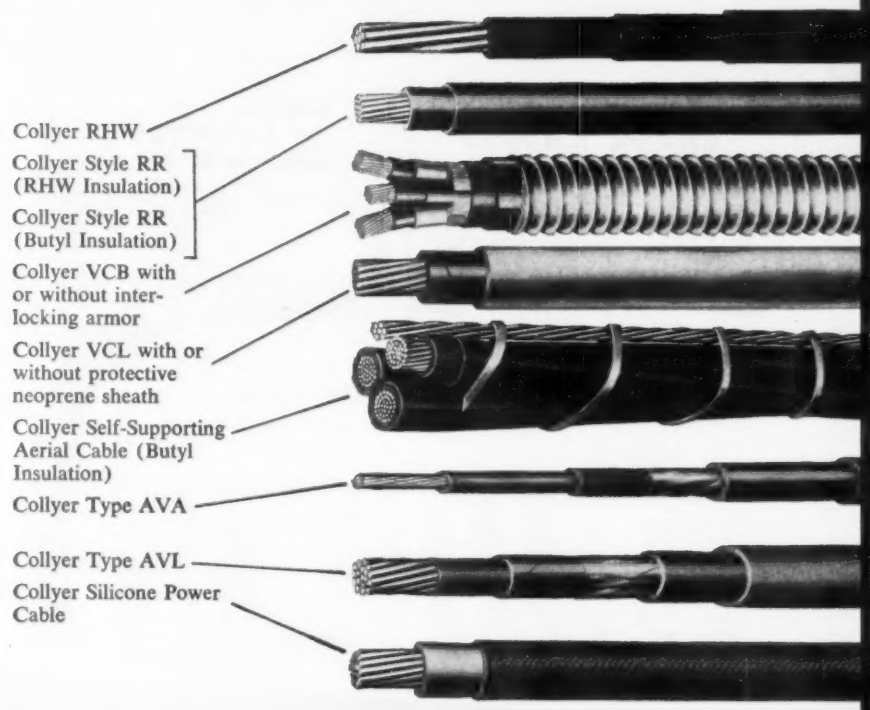
ST. LOUIS 22, MISSOURI
Henderson Sales Company
13014 Manchester Avenue

SALT LAKE CITY 15, UTAH
Bruce Emmett Company
410 Wall Street

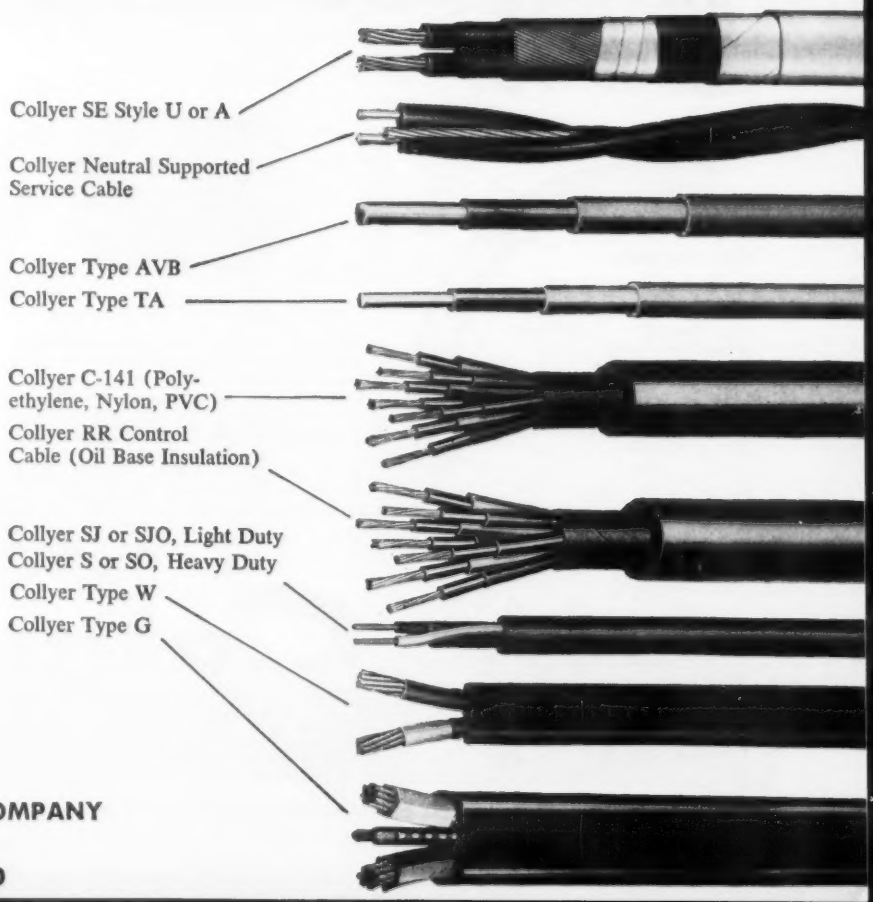
SAN FRANCISCO, CALIFORNIA
The Baxter Company
101 Kansas Street

SEATTLE, WASHINGTON
Bruce Emmett Company
1016 First Avenue S.

SPOKANE 15, WASHINGTON
Bruce Emmett Company
N-5923 Drumheller Street

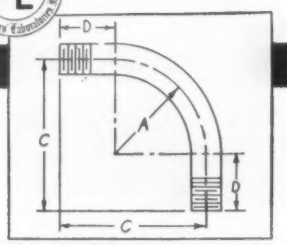

Collyer RHW
Collyer Style RR (RHW Insulation)
Collyer Style RR (Butyl Insulation)
Collyer VCB with or without interlocking armor
Collyer VCL with or without protective neoprene sheath
Collyer Self-Supporting Aerial Cable (Butyl Insulation)
Collyer Type AVA
Collyer Type AVL
Collyer Silicone Power Cable

ANYWHERE... ANY KIND... CALL FOR Collyer


Collyer SE Style U or A
Collyer Neutral Supported Service Cable
Collyer Type AVB
Collyer Type TA
Collyer C-141 (Polyethylene, Nylon, PVC)
Collyer RR Control Cable (Oil Base Insulation)
Collyer SJ or SJO, Light Duty
Collyer S or SO, Heavy Duty
Collyer Type W
Collyer Type G

COLLYER INSULATED WIRE COMPANY
265 ROOSEVELT AVENUE
PAWTUCKET • RHODE ISLAND

SIZES OF SPECIAL LARGE RADIUS 90° ELBOW



radius "A" in inches	offset "C"	straight end "D"	length unbent	pipe sizes
12"	1'9"	9"	3'0"	1"-2½" inc.
15"	2'0"	9"	3'6"	1"-3" inc.
18"	2'4"	10"	4'0"	1"-3½" inc.
24"	2'11"	11"	4'11"	1"-4" inc.
30"	3'5"	11"	5'9"	1"-5" inc.
36"	3'11"	11"	6'6"	1"-6" inc.
42"	4'6"	12"	7'6"	1"-6" inc.
48"	6'0"	12"	8'4"	1"-6" inc.

Also available 45°, 30° and 60°. All are U.L. approved.

Elbows
90° and 45°

have smooth, work-speeding raceways

Conduit of Columbus elbows are U.L. approved. They are available in sizes ½" to 6". Sizes ½" to 2" are conveniently cartoned and all are shipped promptly from factory or from one of ten strategically located warehouses.

Nipples

for convenient, money-saving connections

Conduit hot-dipped galvanized nipples are carefully threaded and chamfered, rigidly inspected and U.L. approved. Available in all sizes for prompt shipment from factory or ten strategically located warehouses. Sizes: ½" x close to 2" x 6" are all attractively packaged. Larger sizes 2½" to 6", in various lengths, also available.

Specify these Columbus conduit fittings
...look for the UL Label

EMT Elbows

have clear channels

Smooth raceways mean quick installation without cable damage . . . reduce contractors' costs.

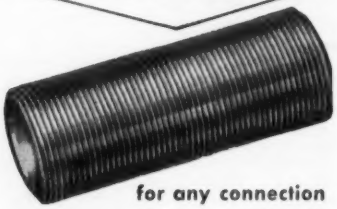
Conduit E.M.T. Elbows are made in sizes 1", 1-¼", 1-½", and 2". They are U.L. approved. Conveniently packaged at no extra cost. Shipped promptly from factory or from one of ten strategically located warehouses.

Couplings

for right—tight connections

Accurate tapping, careful chamfering and rigid inspection combine to give users completely satisfactory installations. Conduit Couplings are hot-dipped galvanized or black enameled . . . are available in all sizes from ½" to 6". Sizes ½" to 2" are conveniently packaged at no extra cost. Shipped promptly from factory or from one of ten strategically located warehouses.

Running Thread



for any connection

Conduit running thread is furnished in convenient 3' lengths in three finishes: raw black, electroplated and hot-dipped galvanized. Your orders can be shipped promptly from the factory or from one of ten strategically located warehouses.

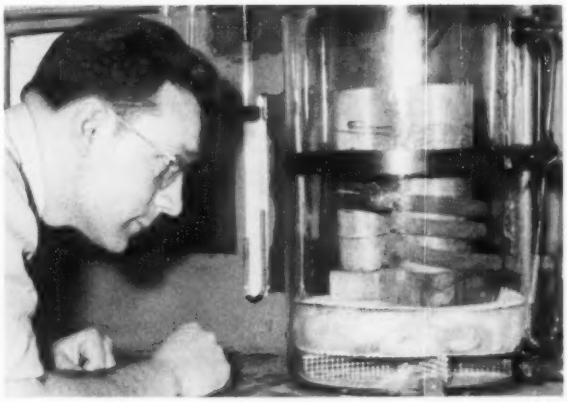
Sold only through recognized wholesalers

Columbus®
BRAND
CONDUIT FITTINGS

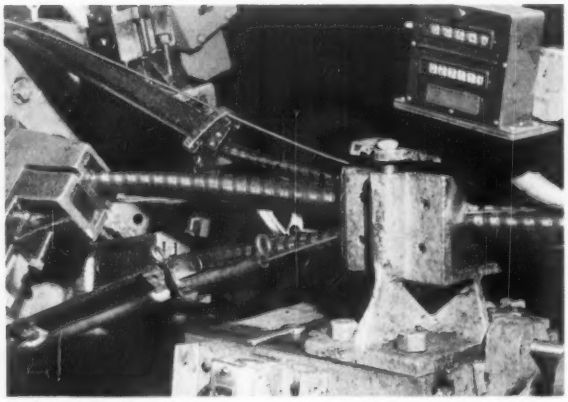
CONDUIT PIPE PRODUCTS COMPANY -- COLUMBUS, OHIO

WHAT'S THE DIFFERENCE IN ELECTRICAL WIRE AND CABLE?

You'll find the difference in



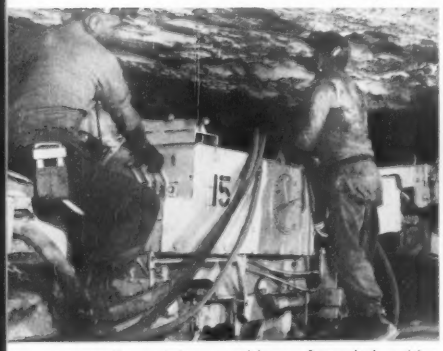
Research and development. American Steel & Wire maintains a large staff of fully qualified engineers whose objective is to improve existing products and develop new ones. This is the key to a successful research program.



Design Engineering. Cable design is an art in itself requiring ability to combine electrical and mechanical elements to withstand all the destructive forces encountered in service.

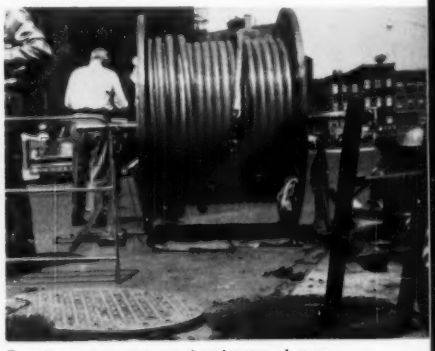
Quality Control. From conductor to jacket, every step of manufacture is carefully controlled to make sure you receive the best Tiger Brand Cable for your particular application.

Specially engineered USS Tiger Brand Electrical Cables



For mining machines. Amerclad cables that provide long service in spite of bending, twisting and general hard usage.

For shovels. Cables that operate continuously under the most adverse conditions of weather and abrasion.



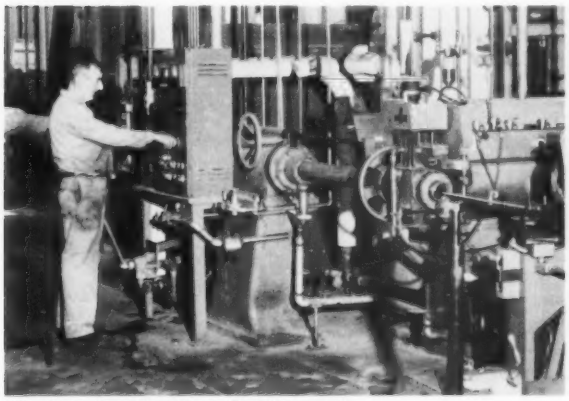
For city power systems. Lead-covered, gas-filled, paper cables for reliable service.

USS Tiger Brand—here's why!

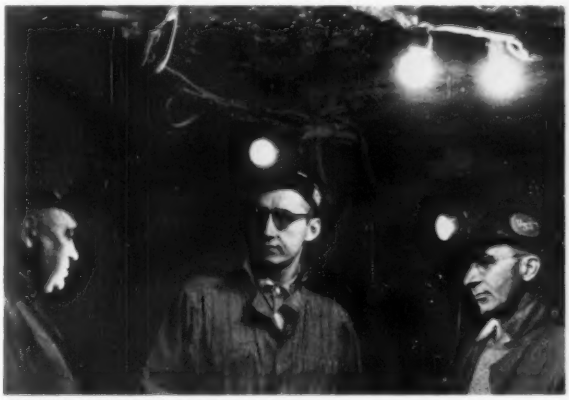
For more than 68 years, American Steel & Wire has been producing the finest quality electrical wire and cable. In this period, we have constantly aimed to improve materials, develop better constructions and use the best cable manufacturing processes. We have two good reasons for doing this; first, our customers demand the most reliable cable they can get, and second, they want the advantages of the latest developments in research, design and engineering.

The differences in electrical cable are seldom visible at a glance. They show up, for example, in mining machine cable that absorbs shock and vibration, withstands crushing weights, and severe abrasion for unbelievably long periods. Or they appear in a new irradiated polyethylene cable designed for extra-high resistance to heat and moisture . . . in submarine cables that work under water for 30 or 40 years . . . in power cables that resist corona cutting.

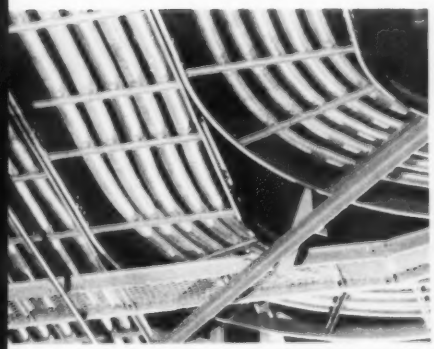
In USS Tiger Brand Cables, you reap the advantages of all the research, engineering skill and manufacturing experience gained in making every type of cable from the smallest control cable to the largest dredge cable. There is a difference in cable—and you'll find it by using Tiger Brand.



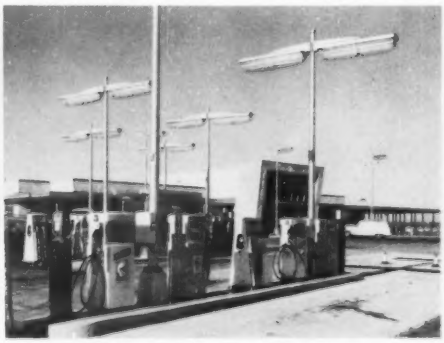
Modern Production Equipment. This new and up-to-date continuous vulcanizer is just one of the many new pieces of precision equipment that result in uniform high quality of USS Tiger Brand Electrical Cables.



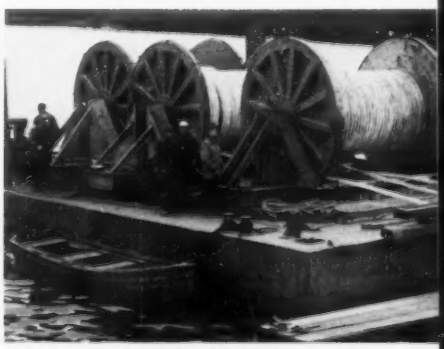
Field Engineering. Where specific problems are encountered, our field service engineers are available to help you choose the right cable for the job or to suggest different constructions to obtain better service.



For industrial plants. Armorlokt armored cables eliminate conduit, reduce installation costs.



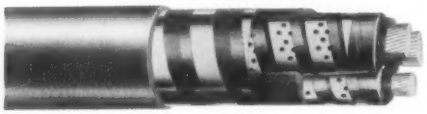
For highway lighting. Type RR power cable resists soil acids in direct burial.



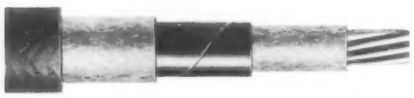
For underwater use. Armored submarine cable supplies dependable power for years.

(more on next page)

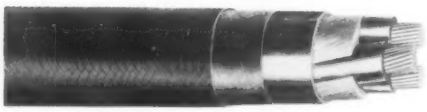
Quick facts on USS Tiger Brand Electrical Cables



Tiger Brand Paper Cable—Premium quality cable for high voltage use. Regular copper-bearing lead or tellurium lead sheaths available—both protected during manufacture by blanket of inert gas to prevent formation of oxides. All constructions available including neoprene (glass-reinforced) and plastic sheaths.

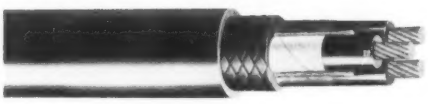


Tiger Brand Asbestos Cable — Cotton or asbestos braids, lead sheaths or interlocked armor coverings furnished. Available in asbestos or asbestos varnished cambric construction also in the new Type IPE (irradiated polyethylene) construction for extra high resistance to heat and moisture.

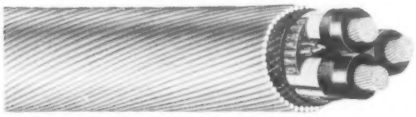


Tiger Brand Varnished Cambric Cable—Furnished in braided coverings (for dry installations), lead sheaths (for underground distribution), or armored coverings (for exposed work). Versatile, dependable, rugged, and economical "work horse" of standard insulations.

Tiger Brand RR Cable—Rubber-insulated neoprene sheath. A versatile cable for control and power applications. Both "conduit and duct" or "direct burial" (heavy jacket) types are available. Many constructions, including self-supporting aerial cable, can be furnished.



Tiger Brand Amerclad—The very highest quality in heavy-duty portable cords and cables. All jackets are vulcanized in a lead sheath, and are permanently marked with molded identifications. Over-all neoprene jackets show phenomenal resistance to abuse, sunlight, grease, oil or acid mine water.



Tiger Brand Submarine Cable—Special marine insulation, used on leadless armored cables, has over 40 years of proven operation in all types of underwater service. American Steel & Wire pioneered the use of aluminum armor for salt water installation.

Tiger Brand Interlocked Armor Cable— Aluminum, bronze, galvanized or stainless steel armor furnished over any type of insulated core. Features higher current carrying capacity (cable in free air), ease of installation and maintenance, and space saving. Rubber or varnished cambric insulations are standard.

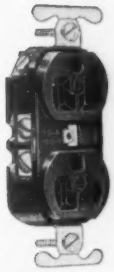
Tiger Brand Elevator Cable—Carefully designed to insure the right amount of flexibility for smooth, straight trailing. Annunciator, control, signal, or lighting cables with braid or neoprene covers can be furnished, with steel supporting strand added for high-rise elevators.

For more detailed information, get in touch with American Steel & Wire, 614 Superior Ave., N.W., Cleveland 13, Ohio.

USS, Tiger Brand, Amerclad, and Armorlokt are registered trademarks

USS American Steel & Wire Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, Distributors Abroad



2515 *

3401 *

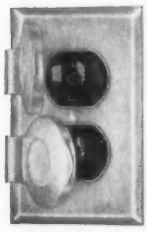
3213-I *

CIRCLE F WIRING DEVICES

136 *

2035 *

3650 *



585 *

2517 2516 *

864-SO *

2632 *

whatever your ***wiring device*** *needs . . .*

CIRCLE F devices give you everything you want—and you save money, too! High quality, low cost Circle F wiring devices provide fast, easy installation, trouble-free service and eliminate call-backs. Precision engineering and quality-controlled production plus rugged construction guarantee customer satisfaction. Circle F devices are available at Electrical Wholesalers everywhere for quick pick-up or delivery.

*Only one of a complete line. For additional information, write for catalog.

CIRCLE F MFG. CO.

TRENTON 4, NEW JERSEY • For your wire requirements: Eastern Insulated Wire Corp., Box 591, Trenton, N. J.

EASIER TO DO... and costs less too!

B-M
INDENTER FITTINGS and TOOLS

Here is the combination that is unbeatable when it comes to easier E.M.T. installation at less cost. New lightweight plier size indenters make setting up thin wall conduit a breeze. B-M fittings are neater too! No unsightly nuts or projecting set screws.

A few more of the plus features of B-M fittings are Concrete tight—Vibration resistant—Extra heavy bright zinc plate, salt spray and acid drip tested for corrosion resistance—Extra heavy positive bonding locknuts—Smooth rounded edges or bushed throat type connectors that prevent insulation damage—All steel construction with extra heavy gauge wall thickness.

Red Throat
BM-21B
½" Connector

Red Throat
BM-22B
¾" Connector

Red Throat
BM-23B
1" Connector

BM-41
½" Coupling

BM-42
¾" Coupling

BM-43
1" Coupling

BM-51 **BM-52**
½" Offset Connector
¾" Offset Connector

BM-21
½" Connector

BM-22
¾" Connector

BM-23
1" Connector

BM-No. 600
Changeable Jaw Indenter

BM-No. 1000
Handvise for ½", ¾" and 1" E. M. T.

BM-No. 100
Cutter for ½", ¾" and 1" E. M. T.

BM-No. 607
½" Indenter
BM-No. 608
¾" Indenter

UL

TELESCOPE BM SYSTEM

All B-M indenter type fittings far exceed the requirements of U. L. file card E 10863 and Federal Specifications W-F-406.

BRIEGEL METHOD TOOL CO.
GALVA • ILLINOIS

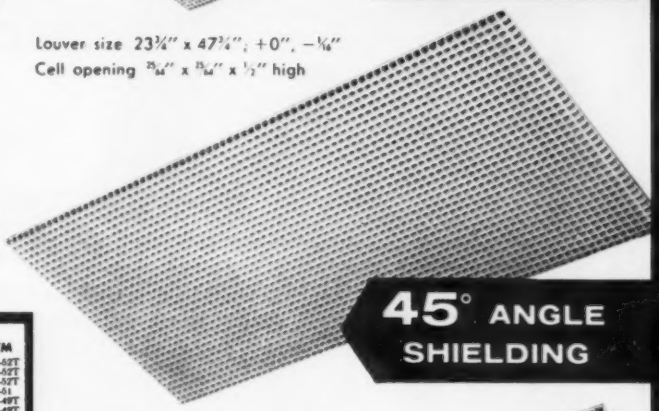
Now! Your choice of 3 shielding angle louver diffusers

WITH UNEXCELLED LIGHTING PERFORMANCE FOR TODAY AND ALL FUTURE HIGH LIGHTING LEVEL REQUIREMENTS . . . . .

AMERICAN LOUVER offers 3 shielding medias—42°—45° and the all new 55° louver, for higher lighting efficiency and uncluttered appearance—they will meet your most rigid lighting requirements for individual fixtures, modules or complete louvered ceilings.

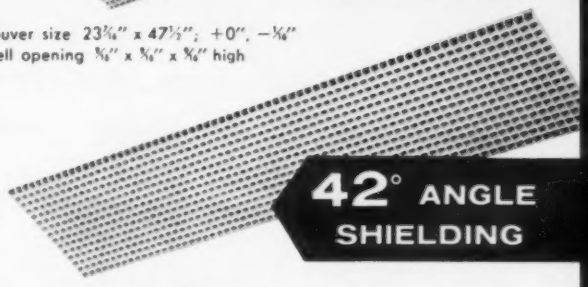
55° ANGLE SHIELDING

Louver size 23¾" x 47¾"; +0", −⅛"
Cell opening $^{25}/_{64}$" x $^{25}/_{64}$" x ½" high



45° ANGLE SHIELDING

Louver size 23¾" x 47½"; +0", −⅛"
Cell opening ⅜" x ⅜" x ⅜" high



42° ANGLE SHIELDING

Louver size 10¾" x 47¾"; +0", −⅛"
Cell opening ⅜" x ⅜" x ⅜" high

It pays to specify American louvers

- PERMANENT COLOR STABILITY
- HIGH IMPACT FOR GREATER STRENGTH
- EASY TO HANDLE—LIGHT WEIGHT
- PATENTED INTERLOCKING LOUVERS
- ASSURE PERFECT ALIGNMENT
- LOW COST UPKEEP—EASY TO CLEAN
- AVAILABLE IN COMBINATION OF SIZES
- LOUVERS MAY BE CUT TO SPECIFICATIONS

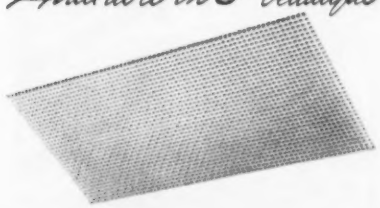
american plastic louvers

	Units	Formulation HF 77-1040	ASTM
MECHANICAL			
Tensile Strength	Lbs. per sq. in.	6500–8000	D638-52T
Elongation at Break	Percent	1.8–2.4	D638-52T
Modulus of Elasticity in tension	lbs./sq. in	4–5 x 10⁵	D638-52T
Hardness	Rockwell	M70–80	D785-51
Flexural Strength	Lbs. per sq. in.	9000–13,000	D790-49T
Deflection at Break	Inches	0.15–0.35	D790-49T
Impact Strength			
⅛" x ⅛" Notched	Izod ft. lbs. per in. of notch	0.25–0.35	D256-47T
⅛" x ⅛" Date End Notched	Izod ft. lbs. per in. of notch	0.60–0.70	D256-47T
⅛" x ⅛" Dead End Notched	Izod ft. lbs. per in. of notch	0.30–0.40	D256-47T
Machining	— — —	Average	
THERMAL			
Thermal Expansion	In./in. per °C	6–8 x 10⁻⁵	D696-44
Heat Distortion	°F. at 264 psi	183–191	D648-45T
	% at 4000 psi at 50°C.	0.8–1.0	D621-51
Deformation Under Load	% at 2000 psi at 50°C.	— — —	D621-51
OPTICAL			
Light Transmission # 1040 Pigmentation			
0.250" thick	Percent Transmission @ 550 mu	52	
0.100" thick	" " " "	38	
0.150" thick	" " " "	39	
PHYSICAL			
Specific Gravity		1.04–1.08	D792-50
Moisture Absorption	Percent	0.03–0.04	D570-42
Burning Rate (0.050" thick)	In./min.	1	D635-44
ELECTRICAL			
Dissipation Factor	10⁶ cycles	.0001–.0006	D150-47T
Dielectric Constant	10⁶ cycles	2.65–2.85	D150-47T
Dielectric Strength	Volts/Mil. ⅛" thick	400	D149-44
Volume Resistivity	Ohm/cm	10^{16} "	D257-46T

The above data represent average values determined on virgin molding powder under appropriate A.S.T.M. tests conducted in the present range of Lustrex Permatone* colors, formulations.

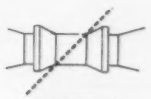
* Lustrex Permatone Reg. U.S. Pat. Off. Monsanto Chemical Company

Available in 5 beautiful pastel colors



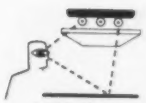
White, Blue, Green, Pink, Yellow and Low Brightness Grey.

COLOR STABILITY

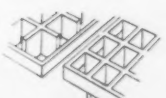


IDEAL SHIELDING

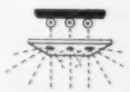
LIGHTER WEIGHT



LOW SURFACE BRIGHTNESS



INTERLOCKING



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This well made toggle bolt makes fastening to tile, plaster, wall board, or any type of hollow construction, quick and sure. Its lively spring, when released, spreads the steel wings into open position —tightening develops maximum holding power.
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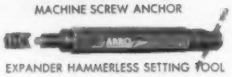
TWO WING TOGGLE BOLT

TUMBLE TYPE TOGGLE BOLT

SILVER KING SELF DRILLING SHIELD

MACHINE SCREW ANCHOR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MAL-LEAD BOLT ANCHOR

STUD BOLT ANCHOR

SPIRAL-DRIVE NAIL ANCHOR

LEAD SCREW ANCHOR

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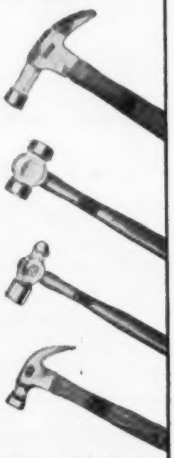

No. 88—Electricians Long-Neck Hammer. For working over conduit, nailing-up junction boxes, etc.

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No. 20—Ball Pien Hammer. Full range of sizes from 2 oz. to 3 lbs.

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SERIES	OPERATION	SWITCH	VOLTAGE	AMPS.	INTERMATIC QUALITY FEATURE
T 100	1 to 12 on-off per day	SPST DPST SPDT	125/250 volts	35	Standard ON-OFF switch.
T 170	1 to 12 on-off per day	SPST DPST SPDT	125/250 volts	35	Same as above, plus skips operation on selected days, automatically.
T 180	1 to 12 on-off per day	SPST SPDT	125/250 volts	35	Each on-off period independently adjustable from 5 to 60 minutes.
T 960	1 to 96 on-off per day	SPST SPDT	125/250 volts	20/15	Each on-off period in 15 minute units. Trippers permanently attached to dial.
C 8300	1 to 12 on-off per 12 minutes	SPST	125 volts	15	Timings from 10 seconds to 11 minute, 50 second periods.
T 500-R	1 to 12 on-off per day	SPST DPST	125/250 volts	55	Heavy duty standard ON-OFF switch. Up to 27,500 watts. Also available with "SKIPPER" feature.
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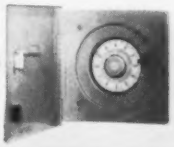

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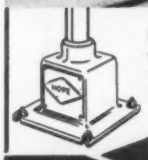

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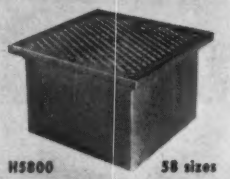
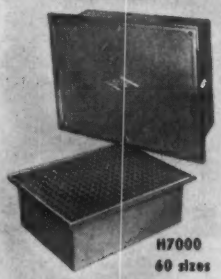


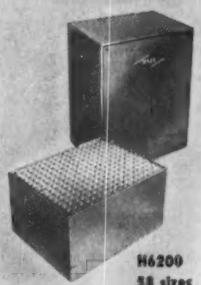
H5800 58 sizes

SIDEWALK BOX WITH CHECKERED NON-SKID COVER



H7000 60 sizes

FLANGED RECESSED COVER BOXES, PLAIN OR CHECKERED COVER



H6200 58 sizes

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138 sizes

HINGED COVER, WITH WING NUT CLASPS, RETAINED GASKET

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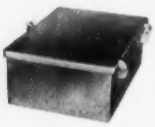
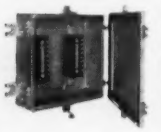
PLAIN SCREW COVERS



H5500
50 sizes

PIN HINGED COVER WITH SINGLE WING CLASP



H3200-T
17 sizes

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All new General Electric heavy duty (TH) and heavy duty interrupter (THD) safety switches were recently tested for short circuit operation with current limiting fuses at G.E.'s High Voltage Test Laboratory in Philadelphia. The results prove that both TH and THD switches will stand up under a 200,000-ampere short circuit when used with General Electric CLF* high interrupting capacity fuses or other current limiting fuses of comparable characteristics as defined in NEMA Standards FU1-1959. An independent engineering firm supervised the tests and certified all results.

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Typical 3 Phase Tests of G-E Heavy Duty Safety Switches at 200,000 Amperes Available

Type Switch	Average Available Symmetrical Amperes	Circuit Voltage		Duration of Max. Peak Current Flow	Type of Test	
		Open	Closed		Close Device On Fault	Close Fault On Device
Heavy Duty 600 Volts a.c. Type TH	210,000	610	497	18°	X	
	210,000	610	497	36°		X
Heavy Duty Interrupter 250 Volts a.c. Type THD	203,000	256	222	18°	X	
	203,000	256	222	18°		X
Heavy Duty Interrupter 600 Volts a.c. Type THD	210,000	610	497	18°	X	
	210,000	610	497	36°		X

GENERAL ELECTRIC

Circuit Protective Devices Dept., Plainville, Conn.

HOW MUCH DOES *UNPLANNED* DOWNTIME COST IN YOUR PLANT? $1000...$5000...$10,000 an hour?

In many cases the costs in spoiled processes and lost production amount to several times those figures.

You Can't Bargain With Trouble!

Only preventive measures will reduce it. Periodic inspection of important electrical equipment with a Megger® Insulation Tester, and the records of these tests, will provide the data you need to anticipate trouble—to prevent production line interruptions.

Buy Prevention—Improve Profits

Megger "instruments for prevention" cost only a small fraction of the price of equipment failure, work spoilage and the many other wastes that help to destroy the profits picture.

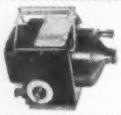
An investment in a Megger Insulation Tester is like the premium on an accident policy except that the Megger Tester can be the means of preventing the accident.

Preventive Maintenance Is Productive

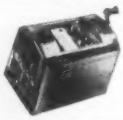
Any production department will thank and even praise a *preventive* maintenance department for its ability to spot trouble before it happens.

We have the answers—want them?

Write for Electrical Preventive Maintenance material—File 21-ECM



MEG® TYPE OF MEGGER INSULATION RESISTANCE TESTER—Available hand-operated, rectifier operated, or with a separate rectifier. Ranges up to 2000 megohms and 1000 volts d-c in all three models. BULLETIN **21-45-ECM**



MEGGER GROUND TESTER measures the resistance of earth to ground connections simply, easily and accurately, and thereby helps to determine whether such connections will perform the services for which they were designed and installed. BULLETIN **25-ECM**

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NO. 348½—Linemen's rounded nose plier. Super-hardened jaws. Polished steel finish knurled grips. Side cutter. Size 8½".

NO. 437—Diagonal cutting plier. Box joint. Polished steel finish. Knurled grips. Length 7".

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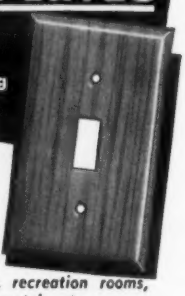

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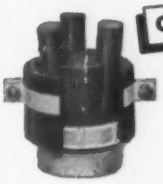
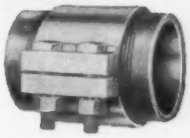
CABLE SUPPORTS
CONDUIT TYPE

CONDUIT FITTINGS



CABLE SUPPORTS
SPLIT TYPE



SPLIT
COUPLINGS

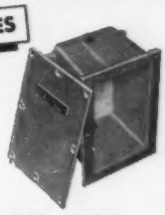
EXPANSION
FITTINGS

INSULATED
BUSHINGS

BAKELITE
BUSHINGS

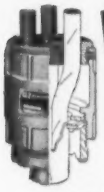
CAST IRON BOXES

EXPLOSION-PROOF
TYPE

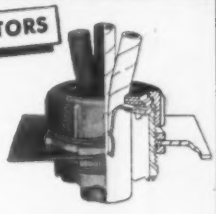


WEATHERTIGHT
SUBMERSIBLE TYPE

CABLE TERMINATORS

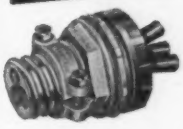


TERMINATING
POTHEADS



SEALING
BUSHINGS

INTERLOCKED ARMOR CABLE FITTINGS



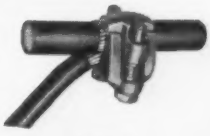
TERMINATORS

SPLICING
FITTINGS

COMBINATION
LUGS

SOLDERLESS CONNECTORS

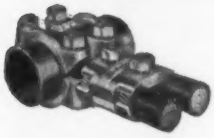
COMBINATION
TWO-WAY
CONNECTORS



SERVICE
TAP

COMBINATION
TEE AND
PARALLEL CONNECTORS

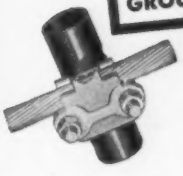
POWER CONNECTORS



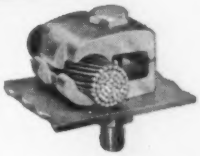
T-CONNECTORS, TUBE
TO MULTIPLE CABLE TYPE

BUS BAR
CLAMPS

GROUND CONNECTORS



CABLE TO PIPE OR ROD
90° OR PARALLEL



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They're O. K. if They're O. Z.

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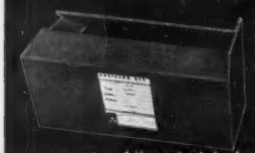
SPLICING KITS, pre-engineered to save time and money



Each item supplied in the correct quantity for a properly designed joint. Time and expense of securing various items from different sources are saved. Accumulation of dead stock is avoided; no waste. All materials kept clean and ready for use. Each splicing kit labeled for easy identification. Cable splicing costs can be determined accurately.

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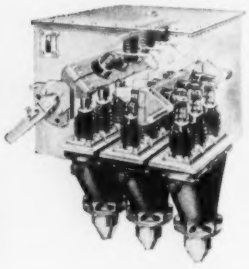
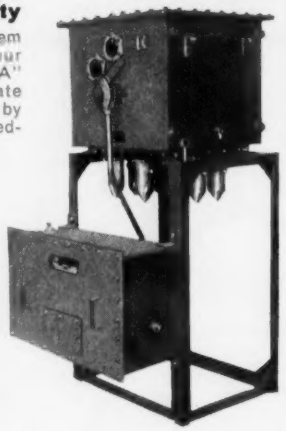
LOAD-BREAK OIL SWITCHES provide cable system flexibility

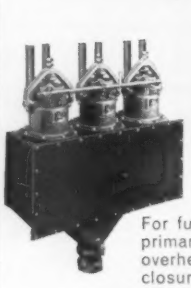
Reduce overtime work on system maintenance. Sectionalize your distribution system with Type "RA" load-break oil switches. Isolate cable faults and restore service by switching loop or duplicate feeders—manually or automatically.

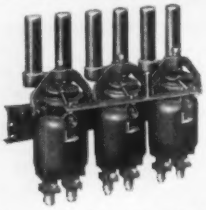
Send for series "D" bulletins.

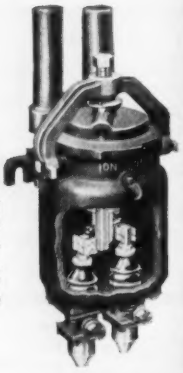




OIL FUSE CUTOUTS

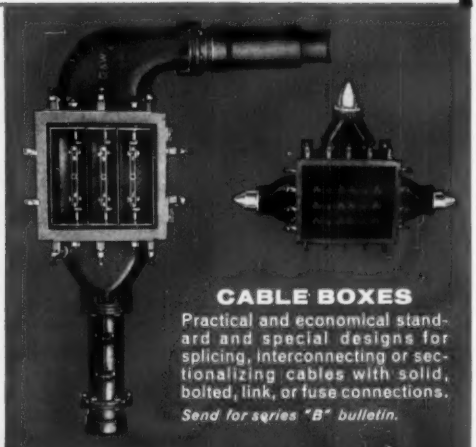






For fusing or load-break switching of primary circuits in subway, vault, or overhead installations. All steel enclosure, oil filled, hermetically sealed, protects men and equipment by safely withstanding high pressures of fuse clearing heavy short circuits.

Send for series "C" bulletin.

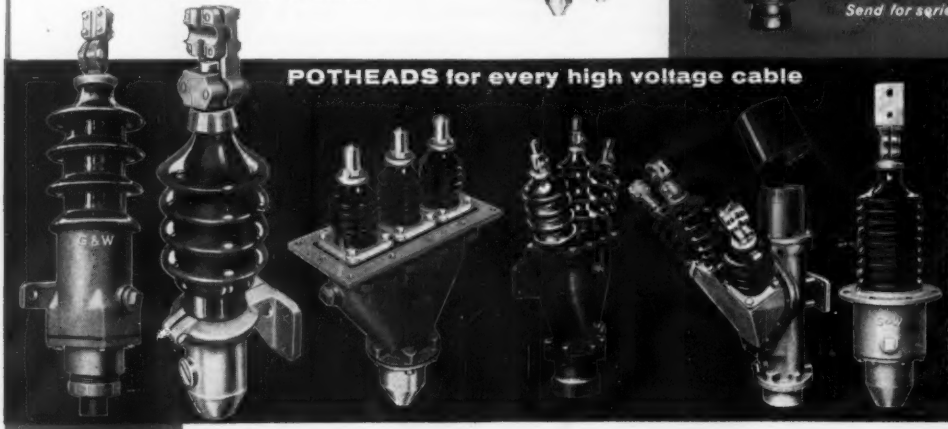


CABLE BOXES

Practical and economical standard and special designs for splicing, interconnecting or sectionalizing cables with solid, bolted, link, or fuse connections.

Send for series "B" bulletin.

POTHEADS for every high voltage cable



Sodertite, capnut, disconnecting. Solder, clamp, or press-style connectors for copper conductors; press-style for aluminum conductors. Wiping sleeve or stuffing box cable entrance seals. Conduit and armor fittings.

For detailed information on the complete G & W line send for series "A" bulletins.

G&W

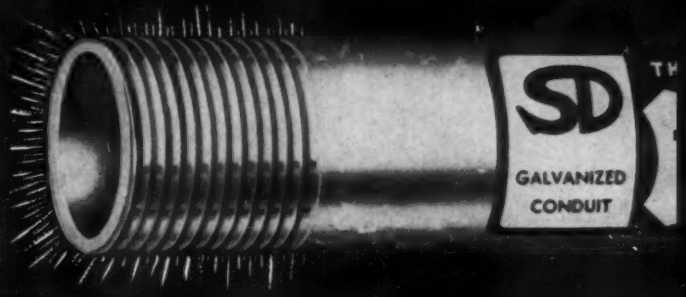
G&W ELECTRIC SPECIALTY CO.

3500 W. 127th Street, Blue Island, Ill. Representatives in principal cities of N. and S. America

Canadian Mfgr.: Powerlite Devices, Ltd., Toronto

NOW UNIFORM GALVANIZED THREADS

CUTS INSTALLATION COSTS BY ELIMINATING RUSTY THREADS AND ASSURING FREE RUNNING COUPLINGS.



OTHER STEELDUCT FEATURES THAT SAVE TIME AND CUT LABOR COSTS

Steel

DOUBLE THREAD PROTECTION

As the zinc protects the sharp, clean Steelduct threads from corrosion, Steelduct plastic and fiber-metal caps protect the threads from damage in rough shipping and storage conditions. Protectors are color coded for easy size identification.

KNURLED — NO WELD BEAD

New enamel plus knurled inner surface and beadless weld of EMT reduces pulling effort 37%. Wiremen bend Steelduct Bend-Aliner EMT to any degree without splitting continuous welded seam.

SD

Steelduct Conduit Meets Federal and ASA Specifications

THE STEELDUCT COMPANY

REPUBLIC STEEL BUILDING — YOUNGSTOWN, OHIO

BISHOP

tapes

sealing splicing jacketing insulating

The most complete line for splicing plastic and rubber insulated cables

... for splicing polyethylene insulated cable

BI-SEAL Self-Bonding (polyethylene base) Electrical Tape is particularly recommended as the primary insulation for low and high voltage polyethylene insulated wires and cables. Extremely low water absorption . . . low power factor . . . low dielectric constant. Operating temperature to 85°C.

... for general insulating and jacketing

VINYL Electrical Tape No. 1 & No. 2, .007" and .010" thick, offers complete electrical and mechanical protection for most taping problems . . . Improved method of bonding adhesive prevents transfer, gives greater strength . . . For better looking, more compact splices.

... for rapid insulation build-up

No. 125 Electrical Filler Tape, ⅛" thick, fuses into a solid mass of high-dielectric insulation in a matter of seconds. This insulating compound in tape form is ideal for cable splice build-up, padding and cable end-sealing.

... for permanent cable jacketing

BI-PRENE Electrical Jacketing (neoprene) Tape protects cable splices wherever oil, gasoline, grease, etc., threaten cable life . . . Particularly for neoprene-sheathed cable . . . Forms a permanent outer sheath.

... for high voltage cable splicing

No. 30 High Voltage Splicing Tape is recommended for splicing cables insulated with ozone-resistant rubber compounds and operating in excess of 2000 volts. This butyl-base tape handles exceptionally well in cold weather.

NEW "NEOFIL" (neoprene) Electrical Filler Tape. A ⅛" thick neoprene compound in handy tape form — for low voltage use. Insulates in one wrap! No covering tape needed!

Bishop Tapes are available through your local Electrical Distributor

MORE THAN A CENTURY OF BISHOP ELECTRICAL INSULATION

BISHOP MANUFACTURING CORPORATION
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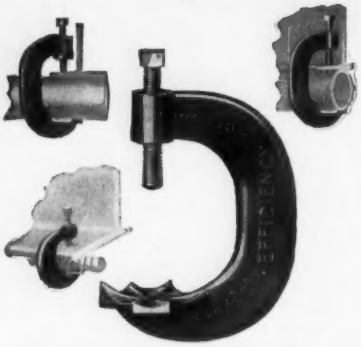
EFFICIENCY

CONDUIT HANGERS · for GAS · CABLE and AIR LINES



On Steel Construction, "Type F" hangers are best for carrying ½ to 2½ pipe and armored cable at any angle to beams.

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ELECTRIC & MFG. CO.
EAST PALESTINE, OHIO

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Weather proof
SAF-T-LOK®
SOLID BRASS COVER PLATES

VERSATILE . . for use with receptacles, switches or combinations. SAF-T-LOK cover plates for every need . . . 1, 2, 3-gang and specials, with or without devices.

CAST ALUMINUM BOXES *in complete line for* 1- and 2-gang devices. 3 to 7 threaded outlets ½" or ¾"; hole spacings fit most standard covers.

WRITE for CATALOG SHEETS & PRICES today!

BELL ELECTRIC CO.
5735 Claremont Ave., Chicago 36, Ill.

SPECIAL REPORT ON

PTC TRANSFORMERS

Showing WHY Electrical Engineers, Consulting Engineers and Contractors should Seriously Consider Specifying and/or Installing them on ANY Job.

THE INSIDE STORY

EVERY PRECISION TRANSFORMER IN THE ENTIRE LINE OFFERS THESE BASIC CONSTRUCTION ADVANTAGES:

1. SPECIAL CORES—Manufactured from high grade, non-aging grain oriented, silicon steel laminations . . . with lowest energy loss of any steel available.

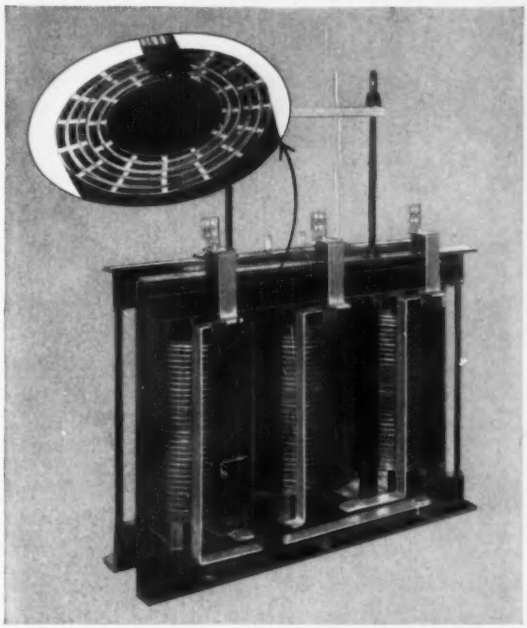
2. EFFECTIVE COOLING DUCTS—More efficient cooling through use of larger, exposed cooling ducts . . . Results in lower operating temperatures.

3. RIGID CORE CLAMPING—Core laminations are clamped together with structural steel; not formed sheet steel.

4. GLASS LAMINATE SPACERS—Tougher, more rigid duct spacers of glass laminate possess dimensional stability and moisture resistance many times greater than wood and paper phenolic.

5. MORE SECURE COIL BRACING— To resist short circuit forces and transportation hazards.

6. SUPERIOR MATERIALS—Insulating varnishes and enamels are selected for highest quality. Coils are made with an interlayer and interwinding insulation of Mylar-Quinterra and glass.



7. BETTER MOUNTING PROVISIONS—Well designed . . . easily accessible mountings . . . ample connecting space and simple wiring terminations.

PERFORMANCE RESULTS

BECAUSE PTC TRANSFORMERS ARE QUALITY BUILT, THEY CONSISTENTLY AFFORD THESE QUALITY RESULTS

1. EXTREME QUIETNESS—

KVA Transformer Rating	Present NEMA	Precision Average Sound Level Standard Design	Special Design
9 – 30	50	40	34
37½ – 112½	55	42	38
125 – 167	60	44	42
200 – 300	62	48	46

2. EFFICIENCY— Precision Transformers have the lowest operating loss of any transformer.

3. TOP OVERLOAD CAPACITY— Operate at lower temperatures at normal load . . . and capable of withstanding increased temperatures due to overload . . . with NO LOSS OF LIFE.

4. RELIABILITY . . . LONG LIFE—Fully meet all the VARYING CONDITIONS under which they must be used . . . stand up under the most severe usage.

5. LOWER INSTALLATION COSTS—All PTC Transformers provide neater installations at lower cost.

6. TOTAL WARRANTY— Unconditionally guaranteed by Precision Transformer Corp. for 5 years.

COMPLETE LINE

Whatever your transformer needs, there is a dependable, quiet, long-lasting PTC dry or liquid type transformer—more than 4,000 models ranging from ¼ to 5,000 KVA.

Included is the whisper-quiet, inside-the-wall "HUSH-FLUSH" design for schools, libraries, hospitals, churches, theatres, etc.

Write today for 4-page brochure providing details on the PTC line.

PTC TRANSFORMERS
• QUIET
• EFFICIENT
• DEPENDABLE

PRECISION TRANSFORMER CORP.
2216 West Lake Street • Chicago 12, Illinois
Representatives in all principal cities

ROSS . . . COMPLETE LINE OF ELECTRICAL ENCLOSURES

try this BENDER on for size

BENDING CIRCLES—INSIDE RADIUS

	*No. 5100	No. 5300
½" Conduit or Pipe	2 3/16"	EMT 4"
¾" Conduit or Pipe	4⅛"	EMT 5"
1" Conduit or Pipe	5¼"	EMT 6"
	No. 5200	**No. 5400**
1¼" Conduit or Pipe	6⅞"	EMT 8"
1½" Conduit or Pipe	8¼"	EMT 10"

*Illustrated

pipe extends legs for any height desired

Now . . . you can have the most convenient working height when you need it . . . where you need it.

For **SIZE . . . WEIGHT and HEIGHT** you won't find another bender that will compare with the on-the-job capabilities of the Lidseen "Chicago" Bender. This rugged, portable, simplified machine is of all welded steel construction. There are no loose parts to be lost or misplaced and the only maintenance is an occasional drop of oil. This improved Lidseen Bender is lighter in weight, at least twice as fast as hydraulic and **bends Aluminum or Steel Conduit equally well.** And Price? Eminently reasonable . . . ask the electrician who is using one; he will tell you it's the finest tool available.

Write for **NEW** *folder on How to Bend Conduit*

LIDSEEN OF NORTH CAROLINA, INC.
1050 FIRST STREET, HAYESVILLE
NORTH CAROLINA

MEASURE
AC and DC
WITH
ONE AMMETER

TONG TEST is the only instrument of its type that measures both alternating and direct current. Press trigger and snap tongs around the electrical conductor for an instant reading, without shutting down equipment. Interchangeable ranges up to 1000 amperes; impossible to read the wrong scale.

Rugged and dependable, safe and accurate. No coils or wires to burn out. Thousands of TONG TEST AMMETERS in use after more than 25 years of active service. Eight types available for conductors up to 3⅞" diameter, or bus bars up to 4½" x ½".

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WE HAVE IN STOCK
HIGHLY TOOLED PRECISION MADE
FLUORESCENT fixture bodies
FOR LIGHTING MANUFACTURERS AND ASSEMBLERS OF COMPLETED FIXTURES UNDER YOUR OWN LABEL

We also specialize in custom fixture work

- *COMMERCIAL*
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All fixtures tooled for minimum assembly, using minimum screws.

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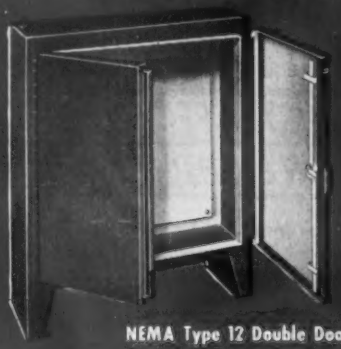
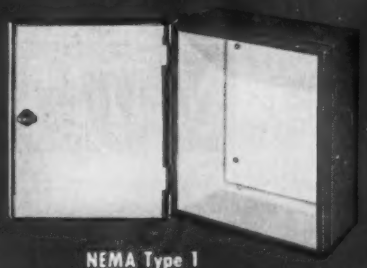
BOSS... COMPLETE LINE OF ELECTRICAL ENCLOSURES

NEMA Type 12 Single Door

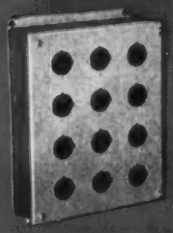


NEMA Type 12 Double Door



NEMA Type 1

Oil Tight Console



Oil Tight Pushbutton

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"The Line of Least Resistance"

From NEMA Type 12 and J.I.C. Enclosures for critical atmospheric conditions, through all types of Wireway and Fittings . . . stock or "specials" . . . BOSS offers you *excellent quality* and *prompt delivery.*

The complete BOSS line is job-engineered for quick, easy installation. Enclosures are code gauge steel with smooth corners and firm, but easy knockouts. All are UL approved. Durable gray baked enamel finish.

Immediate delivery on stock items from central location. Sell BOSS for increased profits. Write for Catalog on the complete line of BOSS Electrical Enclosures.

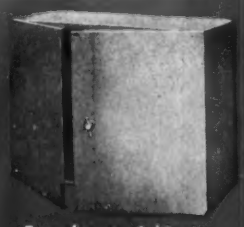
Sold thru leading distributors everywhere.

Heavy Duty Unit Enclosures

J.I.C. Wiring Box and Panel

Type "A" Box

Screw Cover Pull Box



Transformer Cabinet

Telephone Cabinet

J.I.C. Flanged Hinge Cover

Complete Line of Fittings

Flangeless Hinged Cover Lay-In

Flanged Hinge Cover

Flangeless Screw Cover

THE HUENEFELD CO. ENGINEERED PRODUCTS DIVISION

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NEW!

INCANDESCENT FLOODLIGHTS
MERCURY VAPOR LUMINAIRES

BY **MULTI** *THE MOST DEPENDABLE NAME IN LIGHTING*

Now, with the acquisition of the Nepo line of Mercury Vapor lighting equipment and the introduction of a newly designed line of Flood Lighting Units, Multi offers a complete line for outdoor lighting. These new lines will combine the same excellence in engineering, design and precision manufacturing that have made Multi the choice for dependability by engineers, wholesalers, contractors and maintenance electricians for more than 35 years.

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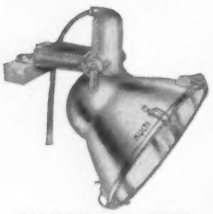

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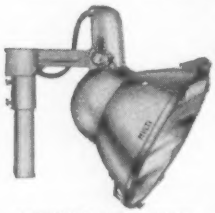
NEW ALUMINUM ENCLOSED ANGLE TYPE FLOODLIGHTS

ALZAK FINISH WIDE OR NARROW BEAM

FOR INCANDESCENT 750-1500 WATT LAMPS OR MERCURY VAPOR 400 WATT LAMP



CATALOG NO. 7200C

HINGED GLASS COVER LENS. HEAT & IMPACT RESISTANT GLASS

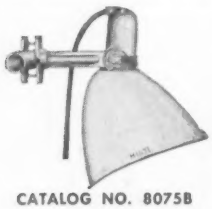
WATERTIGHT CABLE ENTRANCE FITTING

AIM SIGHT-STOP SETTER LOCKING ARM

A QUALITY FLOODLIGHT

CATALOG NO. 537A

GENERAL PURPOSE ALUMINUM FLOODLIGHT ALZAK FINISH 300-500 WATT HEAT & IMPACT RESISTING CONVEX LENS



CATALOG NO. 8075B

PORCELAIN ENAMELED ELLIPTICAL FLOODLIGHT OPEN TYPE 300-500 WATT 750-1500 WATT

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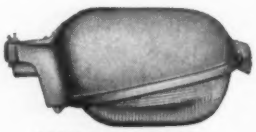
MULTI NEPO MERCURY LUMINAIRES

CATALOG NO. 510CC

A one-piece cast aluminum housing that provides for ballast in-head Alzak reflector, prismatic glass refractor for use with 250W and 400W lamps.



CATALOG NO. 500G

Same general construction as 510CC, but for conventional ballast mounting outside unit. Ideal for expressway, streets, intersections, parking lots, playgrounds, etc.

CATALOG NO. 600

For use with Mercury Vapor or Incandescent Lamps. For side or pendant mounting. Cast aluminum head, Alzak reflector and stainless steel fastenings.

CATALOG NO. 400P

Mercury Vapor perimeter floodlight. An all-purpose outdoor unit for building exteriors, industrial and recreation areas, parking lots, etc.

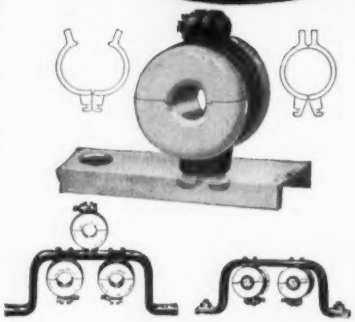
CATALOG NO. A300

A mushroom luminaire with open Alzak reflector sealed over glass, cast aluminum base. For service station plazas, patios, parks, promenades, campuses and other open areas. Utilizes 250W and 400W Mercury Lamps.

Write for literature on the complete line of Multi-Nepo Luminaires, poles, fittings, mountings, etc.

MULTI ELECTRIC MFG. INC.
4231 W. LAKE ST. CHICAGO 24

FOR QUICK, EASY
Cable Installation
"EFFICIENCY"
NESTED CONDUCTOR RACKS



Nested conductor racks are compact and scientifically designed to carry cables equidistant from center to center. Available in 2, 3, 4, 5 and 6 bushing racks.

Write for new catalog

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ELECTRIC & MFG. CO.
EAST PALESTINE, OHIO

for the **LONG PULL** use

Y-ER EAS
Wire Pulling Lubricant

Only Y-ER EAS has all these features

- Creamy, non-corrosive lubricant. Never greasy or messy.
- Prevents sticking or setting. Specially helpful on saddles and turns.
- Does not run back on cables.
- Never harmful to hands or clothing.
- Permanently non-harmful to cables or conduit.

Write for descriptive booklet

GIVES THE SLIP TO—
Lead, Rubber, Braid or Synthetic Covered Cables

Improved Y-ER EAS tested and approved by the Underwriters' Laboratories, Inc.

AT ALL LEADING ELECTRICAL SUPPLY HOUSES

ELECTRO COMPOUND CO.
4150 W. 150th St., Cleveland 35, Ohio

For that certain kind of contractor who demands the best...

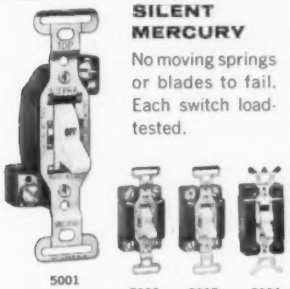
Sierra®

WIRING DEVICES

SWITCHES

SILENT MERCURY

No moving springs or blades to fail. Each switch load-tested.



5001 5002 5003 5004

QuieT SWITCH

Combines effortless toggle action with positive current control.

5011 5012 5013 5014

SAVE THIS HANDY SELECTOR GUIDE

for Specification Grade devices

DESCRIPTION	SILENT MERCURY SWITCHES IVORY	SILENT MERCURY SWITCHES BROWN	QuieT SWITCHES* 15 AMP IVORY	QuieT SWITCHES* 15 AMP BROWN	QuieT SWITCHES* 20 AMP IVORY	QuieT SWITCHES* 20 AMP BROWN
Single Pole	5001	5001X	5011	5011X	5051	5051X
Double Pole	5002	5002X	5012	5012X	5052	5052X
Three-Way	5003	5003X	5013	5013X	5053	5053X
Four-Way	5004	5004X	5014	5014X	5054	5054X
Sierra-Lite with glowing toggle						
Single Pole	5005	–	–	–	–	–
Three-Way	5006	–	–	–	–	–

RATINGS		
125V "T"	250V	120V, AC
10A	5A	15A

RATINGS

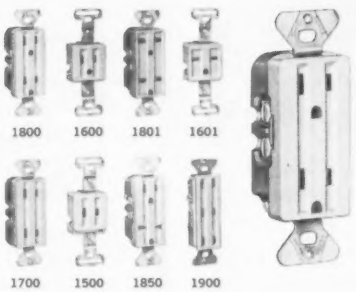
120—277V, AC

*Key operated types also available

RECEPTACLES

SIERRAPLEX

First major design improvement in years! These distinctively styled receptacles are complemented by a full line of matching wall plates. Specification Grade. Meet all existing codes and standards.

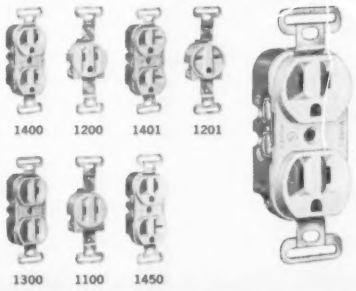


1800 1600 1801 1601 1700 1500 1850 1900

DESCRIPTION	PARALLEL SLOTS 15A-125V IVORY	PARALLEL SLOTS 15A-125V BROWN	TANDEM SLOTS 15A-250V IVORY	TANDEM SLOTS 15A-250V BROWN
BACK AND SIDE WIRED				
Single Grounding-Type 3-wire	1600	1600X	1601	1601X
Duplex Grounding-Type 3-wire	1800	1800X	1801	1801X
Comb. Duplex Grdg-Type 3-wire 15A 125V-250V			1850	1850X
Single Convenience 2-wire	1500	1500X	–	–
Duplex Convenience 2-wire	1700	1700X	–	–
SIDE WIRED				
Single Grounding-Type 3-wire	1602	1602X	1603	1603X
Duplex Grounding-Type 3-wire	1802	1802X	1803	1803X
Comb. Duplex Grdg-Type 3-wire 15A 125V-250V			1852	1852X
Single Convenience 2-wire	1502	1502X	–	–
Duplex Convenience 2-wire	1702	1702X	–	–
Triplex—Single Circuit	1900	1900X	–	–
Triplex—2 Feeds—1 Return	1901	1901X	–	–
Triplex—2 Feeds—2 Returns	1902	1902X	–	–

SIERRA

Conventionally styled, this popular line offers same high quality and craftsmanship as Sierraplex. Features include 2 grounding screws on 3-wire types, handy wire strip gage, and break-off strip for 2 circuits.



1400 1200 1401 1201 1300 1100 1450

BACK AND SIDE WIRED				
Single Grounding-Type 3-wire	1200	1200X	1201	1201X
Duplex Grounding-Type 3-wire	1400	1400X	1401	1401X
Comb. Duplex Grdg-Type 3-wire 15A 125V-250V			1450	1450X
Single Convenience 2-wire	1100	1100X	–	–
Duplex Convenience 2-wire	1300	1300X	–	–
SIDE WIRED				
Single Grounding-Type 3-wire	1202	1202X	1203	1203X
Duplex Grounding-Type 3-wire	1402	1402X	1403	1403X
Comb. Duplex Grdg-Type 3-wire 15A 125V-250V			1452	1452X
Single Convenience 2-wire	1102	1102X	–	–
Duplex Convenience 2-wire	1302	1302X	–	–

WALL PLATES

Choose from world's most complete line! Over 5000 wall plates in Plastic, Brass and Stainless Steel; and in a variety of styles, colors, finishes, combinations and gangs.

STAINLESS "S" LINE | BRASS "B" LINE | PLASTIC "P" LINE | PLASTIC "D" LINE

Write for catalog

SIERRA ELECTRIC CORPORATION

15100 S. Figueroa Street
Box 85, Gardena, California

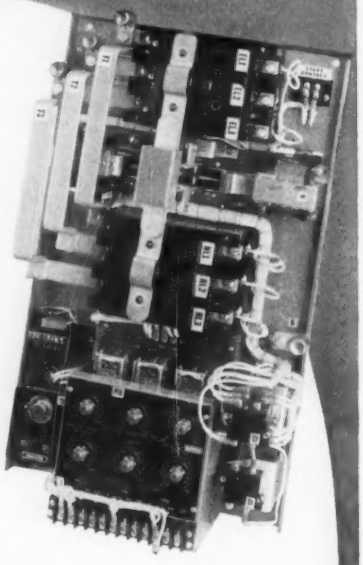
Leadership through craftsmanship

NOW! TWO MODELS FOR NEW VERSATILITY

TRANS-O-MATIC* dual circuit breaker TRANSFER SWITCHES

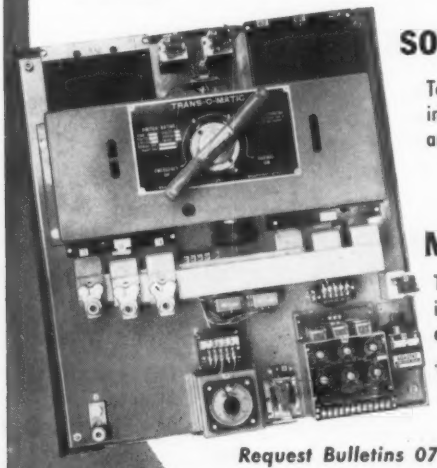
NO NEUTRAL POSITION

DOUBLE SOURCE CONTROL



For higher current interrupting capacities, rely on the motor-operated Trans-O-Matic. For low current service, employ the new low-cost solenoid-operated T-100-A. Both are electrically operated . . . mechanically held, with no neutral position. Both feature Lake Shore's exclusive mechanically-linked dual circuit breaker design for ***positive*** two-position transfer.

Available in 2-pole, 3-pole total failure, partial failure, and under voltage protection, with many optional features.



SOLENOID OPERATED

To 600 volts, 100 amps AC with interrupting capacities to 15,000 amp rms.

MOTOR OPERATED

To 600 volts, 1000 amps AC with interrupting capacities to 100,000 amp rms.†

†With current limiting fuses.

Request Bulletins 07400-07500

**CANADIAN WESTINGHOUSE, LTD., is licensed to manufacture Trans-O-Matics in Canada.*

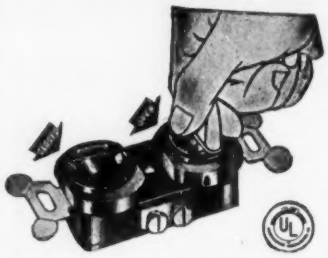
THE Lake Shore ELECTRIC CORPORATION

205 Willis Street BEDFORD, OHIO

For Electrically Safe Homes

SPECIFY

NO-SHOK OUTLETS



PATENTED SELF-CLOSING CAP positively prevents SHOCKS . . . BURNS . . . SHORT CIRCUITS! NO-SHOK automatically prevents insertion of hairpins, wires or other metal objects — protects children against tragic electrical accidents. Install NO-SHOK — an extra selling feature for safety-conscious home buyers!

Write for Details and Prices!

BELL ELECTRIC CO.

5735 S. Claremont Av. • Chicago 36, Ill.

Latrobe PRODUCTS

★FLOOR BOXES★ WIRING SPECIALTIES★

No. 190

"TRU-LEVEL"

Adjustable

STEEL FLOOR BOX

The "Tru-Level" is an adjustable steel box with a 3¼" diameter brass cover plate. There are two ½" and two ¾" KO's in sides and two ¾" and three ½" KO's in bottom. Four 1" side KO's available. Come in two standard heights 3⅛" and 2⅝" for power and telephone.

NON ADJUSTABLE Cast Iron

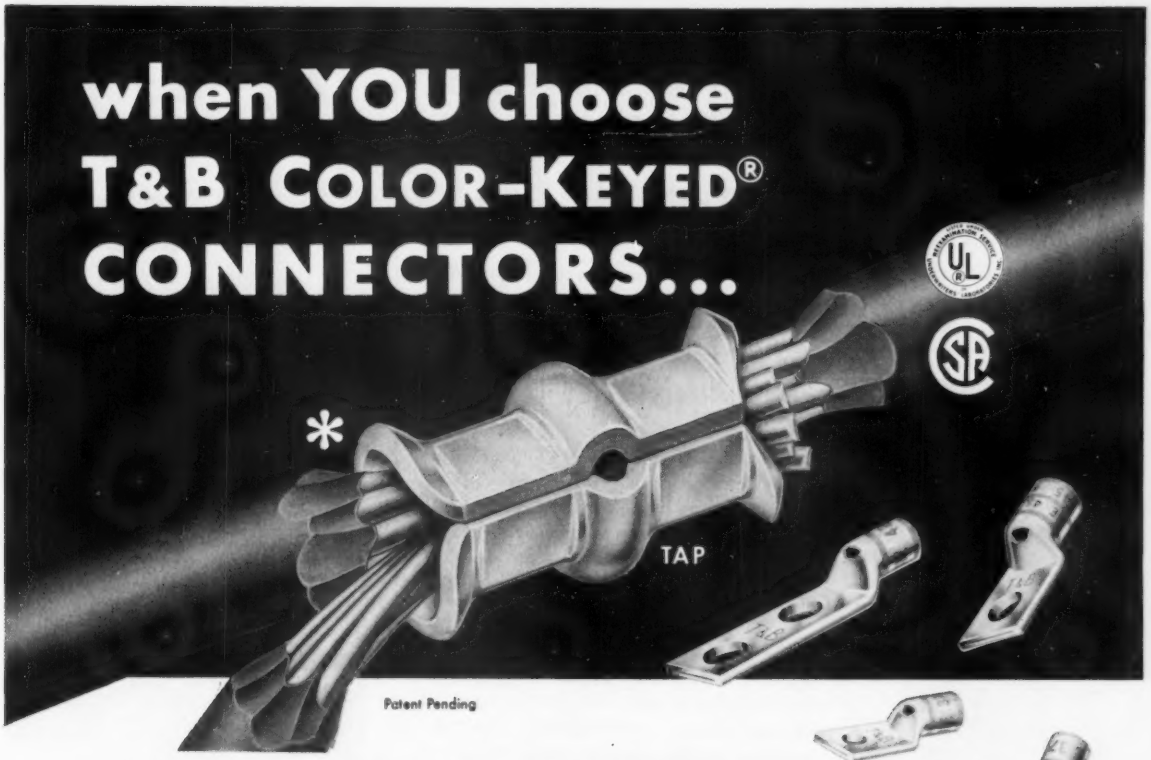
FLOOR BOX

Non-adjustable cast iron floor boxes—3½" diameter brass cover plate, complete with either 2" abandon plug for power or ½", ¾" or 1" for telephone service.

FULLMAN MANUFACTURING CO.

LATROBE . . . PENNSYLVANIA

when YOU choose T&B COLOR-KEYED® CONNECTORS...



Patent Pending

YOU CHOOSE THE ONLY COMPLETE LINE THAT COVERS THE COMPLETE RANGE FROM #8AWG TO 1,000MCM — AND THE LOWEST INSTALLED COST!

TERMINATE

SPLICE

PIGTAIL

Plus...

THE NEW TBM8 HAND TOOL

The only hand tool that installs connectors from #8AWG to 500MCM.

...WITH THE MOST EFFICIENT HAND TOOL YET ...TBM8

Patented

Designed for Code Copper Conductors. There's a complete line for All-Aluminum too! The COLOR-KEYED connector line is T&B Engineered for superior performance at Lowest Installed Cost. It is the only connector system with a full range of Tooling from pocket size hand tools to 40 Ton Hydraulic heads. T&B's 65 years experience has proven that the correct tooling is as important as the correct connector.

***C-TAPS**—the newest addition to the COLOR-KEYED Line.

WRITE FOR COMPLETE LITERATURE

T&B ENGINEERED

SOLD COAST TO COAST EXCLUSIVELY BY YOUR LOCAL T&B DISTRIBUTOR

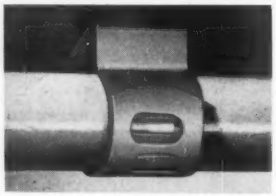
THE THOMAS & BETTS CO. INCORPORATED

ELIZABETH, NEW JERSEY IN CANADA, THOMAS & BETTS LTD. MONTREAL

"One-Word" Reason Why You Should Select PAINE Hanging And Fastening Devices . . .

COM•PLETE•NESS

Paine offers you a *complete* line of quality hanging and fastening hardware. *Completeness* also extends to *complete* service from personal concern with your needs . . . to speedy expediting and prompt delivery of your order. Write for further details today!

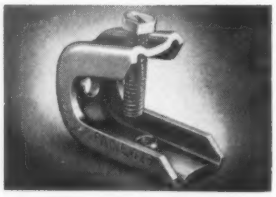


Paine's New Liberty Conduit Clamp

Designed for fast, secure hanging and fastening of thin wall conduit. One-piece unit has unique locking device. Eliminates need for nuts and bolts. Only standard electricians' pliers, screwdriver needed. Flat, smooth fastener—no sharp edges. Saves time and work.

Paine's New Junior Beam Clamp

Fastens in any position, easily, quickly. Secures conduits, switchboxes, pipes, etc. onto "I" beams, ceiling channels, web joists, any type of building framework requiring lightweight, flush-mounted fastening. Assures hidden method of holding conduit pipe above false ceilings.



Paine's New Senior Beam Clamp

Same advantages as "Junior Beam" *except* ideal for heavy-duty applications. Features case-hardened, hexagon-headed, *slotted* cup-pointed screw head. Helps make the heavy-duty jobs faster and simpler than any other beam clamp.

Zinc Plated Hanger Iron

Series #500-A, 524-A and 528-A. Accurate hole-spacing, no sharp or burred edges. Variety of widths and lengths.

Expansion Screw Anchors

Series #9000. Maximum flexibility, great holding power. Precision-threaded. Anchors to any desired depth. Variety of screw lengths.

'Spring Wing' Toggle Bolts

Series #1000. Sure-fire spring action, U channel wings, wide spread grip. Extremely wide range of styles and combinations.

Pipe and Romex Straps

Series #8000. No sharp corners or burred edges. Beaded for extra strength. Available in 1 or 2 hole styles.

Standard Conduit Clamps

Series #445 and #447. Standard Conduit Clamps with stove bolts (#445) or without stove bolts (#447). Sizes are clearly marked. Zinc plated after fabrication. For thin wall and rigid conduit.

'Sudden Depth' Drill Bits

Series #3600. Diamond-hard CARBOLOY tip holds edge longer than any other. Runs cool. Use with any slow speed drill.

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UNEXCELLED SERVICE

"RED TOP" brush with resilient pad . . . absorbs vibration to improve commutation. "RED TOP" Brushes last longer and save equipment wear, increase motor performance. Contact HELWIG today for your carbon brush needs.

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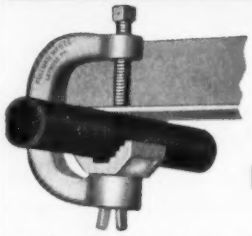
2546 N. 30th St.
MILWAUKEE 10, WISCONSIN
"First in Service"

Latrobe PRODUCTS

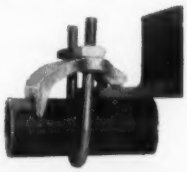
★FLOOR BOXES ★ WIRING SPECIALTIES★



PIPE or CONDUIT HANGERS

For hanging ½" thru 1½" pipe or conduit to steel beams up thru ⅜" thick—parallel or at right angle—no drilling necessary. Ideal for confined areas.

PIPE or CONDUIT CLAMPS



This clamp is made with a double safety bite of case hardened tool steel. Two models—right angle and parallel support—each model comes in 11 sizes for ⅜" thru 4" pipe or conduit.

FULLMAN MANUFACTURING CO.
LATROBE . . . PENNSYLVANIA

CHROMALOX Electric Heating Equipment

supplies the electrical answer for every heating problem to temperatures of 1200°F. The world's largest stock, over 15,000 standard items, is ready for immediate shipment.

In most cases, Chromalox heating equipment can be applied using prepared calculation data. A nationwide network of Chromalox Sales-Engineering Representatives is ready to help you with those applications requiring special engineering and manufacture.

OVER-THE-SIDE IMMERSION HEATERS

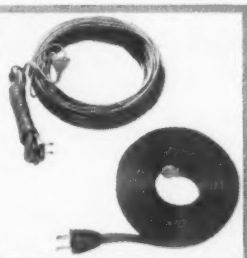
For electroplating tanks, water solutions, alkali cleaning tanks, mineral oil, vegetable oil, wax or paraffin, fuel oil preheating, solvent vapor cleaning tanks.

CIRCULATION HEATERS

For accurately controlled heating of water, oils, heat transfer media, steam, air or other gases, heating rinse water, steam accumulators, process kettles, showers and washrooms, preheating fuel oil.

THERMWIRE HEATING CABLE AND TAPE

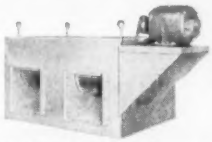
For heating pipes, valves and containers to prevent freezing. Roof eaves and gutters, concrete slab floors, asphalt and concrete driveways, sidewalks.



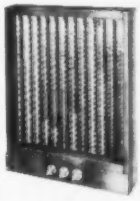
FAR-INFRARED RADIANT HEATERS

For annealing, calendering, curing, drape forming, drying, preheating, embossing, forming and shaping, fusing of cast films and sheets, heat sealing, ink and paint drying, laminating, planishing and polishing, postforming, slush molding, transfer molding, resin curing and finishing, setting paper additives and coating, vacuum forming, vinyl fusing.

BLOWER TYPE UNIT HEATERS



For larger areas requiring greater amounts of heat distribution . . . such as factories, garages, machine shops, drying rooms. For areas where positive circulation is desired to maintain uniform temperatures . . . such as warehouses, garages and plant offices.



IN-DUCT TYPE HEATERS

For mounting in forced air ducts to supply heated air for ovens, dryers, space heating, process work.

BASEBOARD HEATERS

Perimeter heating for homes, offices, lobbies . . . anywhere the ultimate in comfort heating is desired.

UNIT VENTILATORS

Electric heating and fresh air ventilating for schools, churches, theaters, plant meeting rooms, gymnasiums, lobbies . . . wherever large numbers of people congregate in a restricted area.

CHROMALOX
Electric Heat
INDUSTRIAL • COMMERCIAL • RESIDENTIAL
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this PLM catalog of terminating, splicing and ventilating accessories can save time and money!

Don't let terminating or splicing problems hold up needed cable installations! You can find correctly designed answers to them, fast, from PLM — whether your requirements call for standard or special items.

PLM Catalog 301 lists more than 1200 standard types and sizes of terminators, splices, conduit ventilators and unit package kits for making splices and terminations in cable installations through 23 kv. Speed up planning, ordering and installation. Write for your copy today. PLM Products, Inc., 3875 W. 150th St., Cleveland 11, Ohio.

PLM Terminators
Splicing Kits
Conduit Ventilators

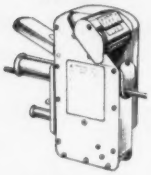
Jiffy PRODUCTS

Saves TIME TROUBLE MONEY

SNAP-IN BLANKS

CLAMP-IN BOX HOLDER

OLYMPIC METERS



SWINGING SOLDER DIPPER

ADJUSTABLE HOLE CUTTER

NO-KINK FISH TAPE

Write now for new 1960 Catalog

ESTABLISHED 1915
Clyde W. Lint
2323 W. 18TH STREET · CHICAGO 8, ILL.

Hoffman
ELECTRICAL ENCLOSURES

A Complete line to fit any need you may have.

NEMA and JIC ENCLOSURES
Boxes and panel enclosures to meet JIC or NEMA types 1, 3, 4, 5 and 12.

★

PUSHBUTTON BOXES
38 Standard sizes to house oil-tight push-buttons.

★

WIREWAY and TROUGHS
Both flanged and lay-in types. Made to JIC standards.

★

CONSOLE CABINETS
Heavy gauge, gasketed door consoles in standard models.

★

WEATHERPROOF POWER OUTLETS
For outdoor construction sites, trailer parks, farms and ranches.

★

WEATHERPROOF TERMINAL BOXES
For underground wiring. Made of steel or cast aluminum.

★

REMOTE CONTROLS
"Switch-O-Lite" weatherproof unit for yard lights, floodlighting, etc.

★

SPECIAL CABINETS
Electrical enclosures custom-built to your specifications. Tell us what you need.

Nationwide stocks: Write us.

Hoffman ENGINEERING CORPORATION
DEPT. EPG-132 1050 Tyler Street Anoka, Minn.

"ADVANCE® FLUORESCENT LAMP BALLASTS SAVE OUR COMPANY MONEY AND KEEP OUR CUSTOMERS HAPPY"

"Fluorescent Lighting Units utilizing efficient, cool operating ballasts require a minimum of service calls that are so costly to us and such an inconvenience to our customers. Quality ADVANCE FLUORESCENT LAMP BALLASTS save our company money and keep our customers happy".

To avoid expensive call-backs and costly down-time for your customers, always demand ADVANCE dependable Fluorescent Lamp ballasts. Their efficiency and performance is proved in millions of lighting units. They are the choice of the nation's leading Original Lighting Equipment Manufacturers and America's foremost Electrical Contractors. Reputations are built and maintained on ADVANCE Fluorescent Lamp Ballasts . . . truly, "The Heart of the Lighting Industry".

"The Heart of the Lighting Industry"®

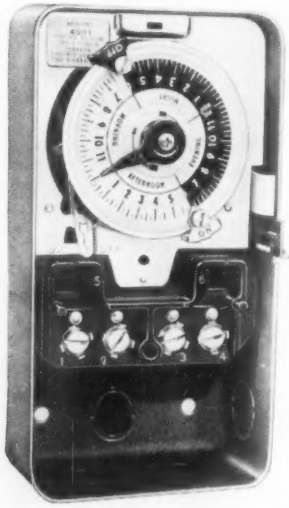
ADVANCE® TRANSFORMER CO.
2950 NO. WESTERN AVE. CHICAGO 18, ILL. U.S.A.

Manufactured in Canada by: Advance Transformer Co., Ltd. 5780 Pare Street, Montreal, Quebec, Canada

Why be puzzled about time switches?

...SPECIFY PARAGON

the 40-amp T-rated switch line



4000 Series introduces a new standard of safety and performance

Complete 24-hour control for lighted signs, window displays, heating units, time signals, etc. Up to 7 *ON-OFF* operations per day, with settings as close as 90 minutes apart.

Safety factor 33% greater because of 40-ampere tungsten design. "Make" and "brake" contacts float free to avert contact welding. Avoids costly call backs. ASTRO DIAL enables you to set time switch to go *ON* at sunset, *OFF* at sunrise . . . or *OFF* at any other preselected time. Spring-wound carryover keeps the 4000 SERIES operating perfectly during periods when power has failed.

Get complete details on the 4000 SERIES now. Write for Bulletin 5919.

PARAGON
ELECTRIC COMPANY
1614 Twelfth St. • Two Rivers, Wisconsin

TIME IS MONEY...CONTROL IT WITH PARAGON

LOOK TO LEACH

RELIABLE RELAYS
Miniature • Sub-Miniature • Contactors

INTELLIGENT RELAYS
Time Delay • Fault Sensing • O/U Voltage and Frequency • Solid State "Static" Switching

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Engine Generators • Motor Generators • Large Rectifiers

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Control Consoles • Patch Panels • Distribution Systems

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Airborne Tape Recorders • Recording Accelerometers • Accessory Electronics • Command Receivers

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Instrumentation • Special Power Supplies • Check-out and Test

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18435 SUSANA ROAD, COMPTON, CALIFORNIA
RELAY DIVISION 5915 AVALON BOULEVARD
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MINERALLAC BEAM CLAMPS

FOR MOUNTING HANGERS ON I-BEAMS

Mounts Minerallac hangers No. 8 to No. 6 on I-Beams safely without necessity of drilling holes. Made of heavy gauge zinc plated steel with deep drawn ribs to give needed strength, these durable, light weight beam clamps have ¼-20 tapped holes—will fit beam flanges up to ½ inch thick. Furnished with case-hardened set screw. Low cost.

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MINERALLAC ELECTRIC COMPANY
25 North Peoria St. Chicago 7, Ill.

MINERALLAC

WIREMOLD® SURFACE METAL RACEWAYS

THE WIREMOLD COMPANY • DEPT. EO-9A, HARTFORD 10, CONNECTICUT

PLUGMOLD® Multi-Outlet Systems

Cover a wide range of electrical outlet requirements — for new construction or rewiring jobs. Mount on any surface . . . walls, work benches, counters, displays, etc. A minimum of fittings is required.

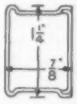
NO.1900

Furnished three ways: unwired (space outlets as desired); factory-wired sections (for short runs); and prewired Snapicoil (outlets on various centers).

NO.2000

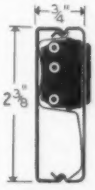
One size raceway accepts five types of outlets — 2-and 3-wire duplex, grounding (A.S.A. Standard) 2-and 3-wire single-circuit, and 3-wire two-circuit.

NO.2100



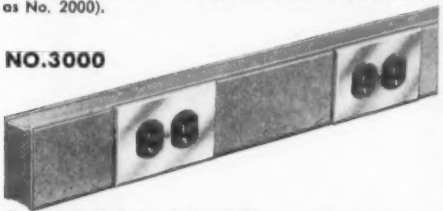
Furnished unwired (space outlets as desired). Receptacles available include 2-wire, 2- and 3-wire grounding, lumiline single, midget twistlock, 3-wire polarized, 3-wire polarized grounding, and T-slot.

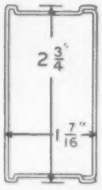
NO.2200



A combination multi-outlet system, wiring raceway and steel baseboard. Same receptacles as No. 2000. Furnished as pre-wired Snapicoil (same as No. 2000).

NO.3000





Any standard device designed for a single gang box can be installed wherever needed within the raceway. Standard flush plates are used.

CAPACITY (for wire types T, TW, RW)

PLUGMOLD		CONDUCTOR SIZE NO. 6	NO. 8	NO. 10	NO. 12	NO. 14
NO. 1900	with devices	—	—	—	3	3
	no devices	—	—	—	3	3
NO. 2000	with devices	—	—	—	3	3
	no devices	—	—	—	3	3
NO. 2100	with devices: consult Wiremold Catalog No. 22					
	no devices	5	8	10	14	17
NO. 2200	with devices	3	7	10	10	10
	no devices	5	8	10	10	10
NO. 3000	with devices	8	10	10	10	10
	no devices	10	12	13	25	30

WIREMOLD® Surface Wiring Raceways

Used along ceilings and walls — to modernize existing wiring, or complete new wiring from panel box to outlets. A minimum of fittings is needed. Four sizes; furnished as one-piece raceways.

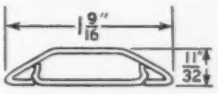
NO.200 **NO.500** **NO.700** **NO.1000**

WIREMOLD	CONDUCTOR SIZE NO. 6	NO. 8	NO. 10	NO. 12	NO. 14
NO. 200	—	—	—	3	3
NO. 500	—	2	3	4	5
NO. 700	—	3	5	6	8
NO. 1000	5	8	8	10	10

PANCAKE® Overfloor Duct Systems

Strong, flat overfloor raceways to carry power and light and communications wiring to locations away from walls. Quickly installed without channeling into floors. A minimum of fittings is needed.

NO.1500



CAPACITY

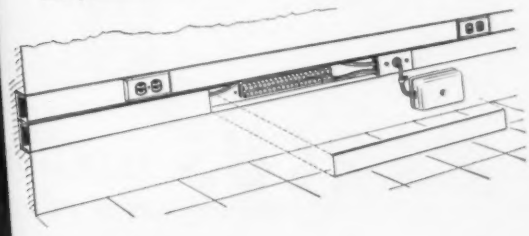
CONDUCTOR SIZE:	NO. 8	NO. 10	NO. 12	NO. 14
wire types T, TW, RW	4	4	6	8

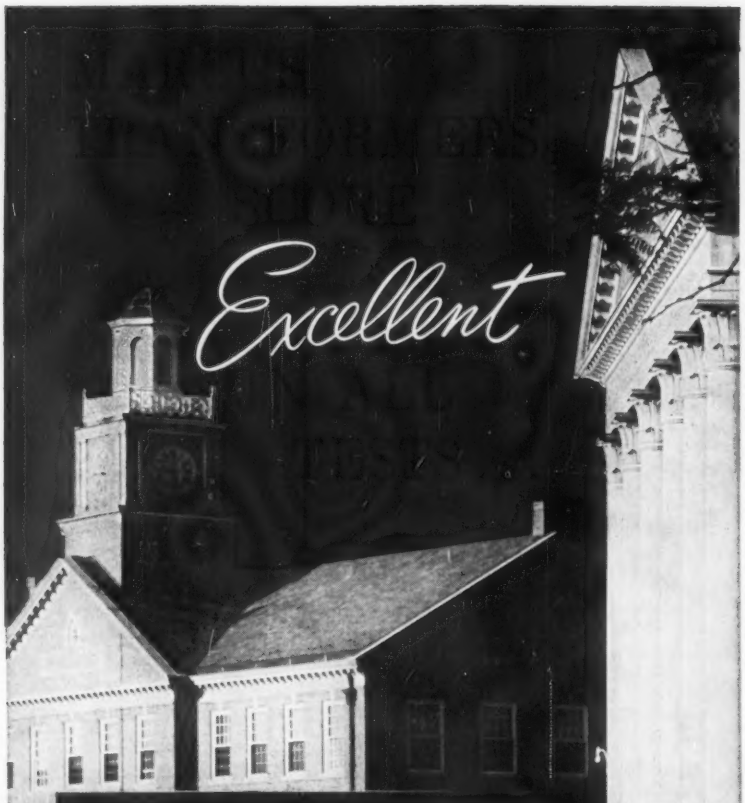
NO.2600 (not shown)

CAPACITY: two 26-pair telephone cables.

TELE-POWER Duct Systems

Consist of a pair of parallel Plugmold Raceways — one for telephone, signal and inter-office communications wiring; the other a multi-outlet system for power and light wiring. Because each raceway has a separate cover, the electrical contractor or telephone installer needs only install or remove the cover for the wiring that concerns him. The high and low potential wiring are not exposed to each other.





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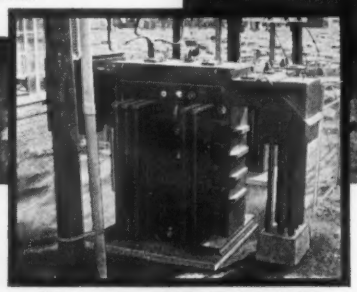

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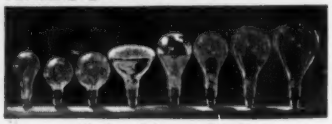

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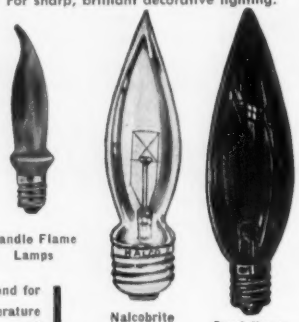

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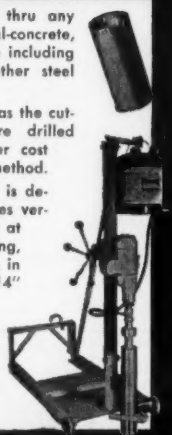

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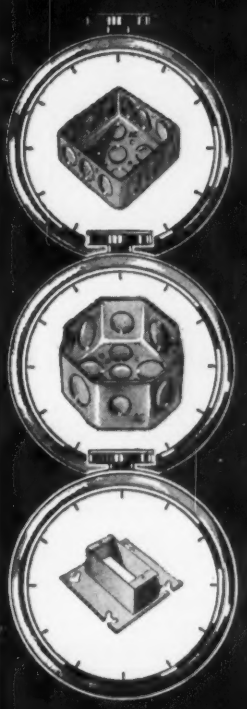

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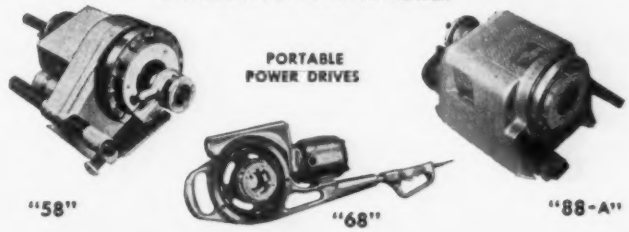

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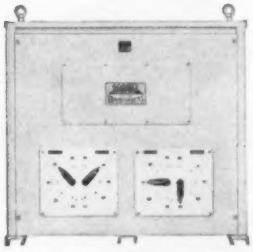

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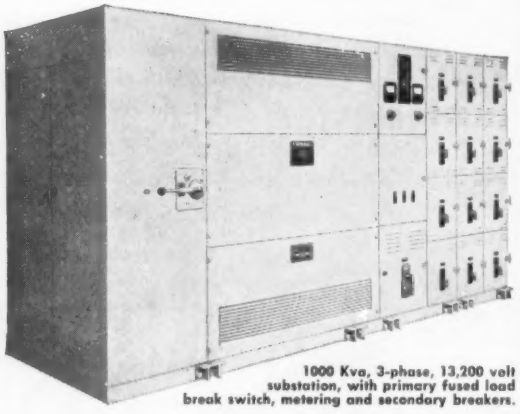

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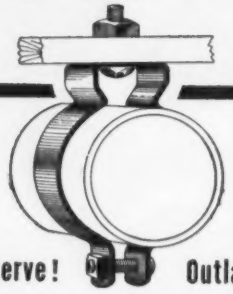

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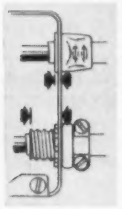

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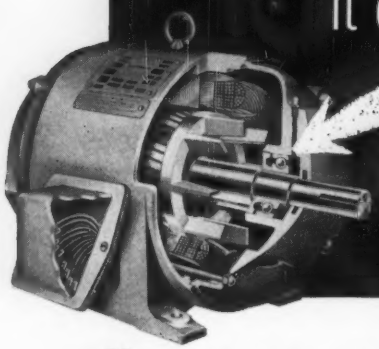

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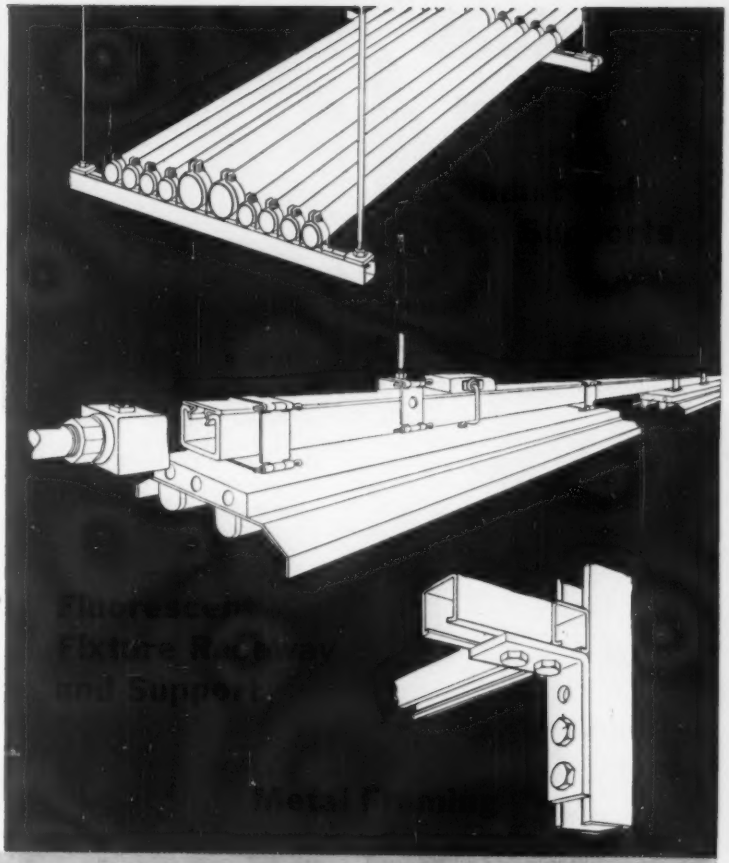

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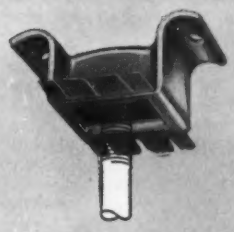

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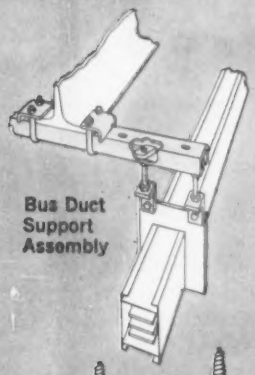
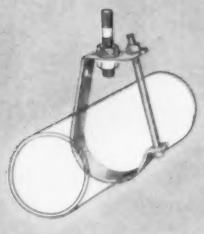


Bus Duct Support Assembly



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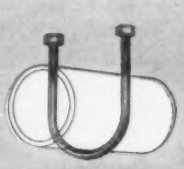

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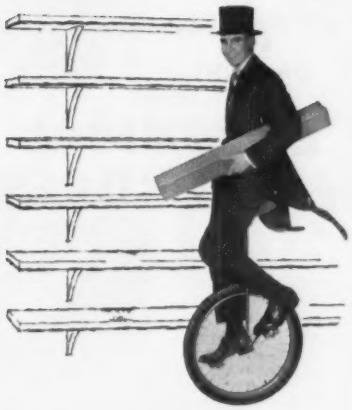

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23334 Sherwood Ave. • Warren, Mich.

Remington Stud Driver

The basic Power Unit...

Here's the single basic tool that gives you a new degree of on-the-job fastening versatility. Only *one* basic unit to buy—the Remington Model 455A—for all your fastening applications. Just choose the instantly interchangeable fastening attachment you need to do the job!

Plus choice of 4 fastening attachments...

R-1 1/4" & 3/8" Light-Duty Captive Stud Attachment uses 22 cal. Power Loads. Use where extra safety is needed.

R-2 1/4" Light-Duty Attachment uses 22 cal. Power Loads. Handles 80% of your fastening jobs.

R-3 3/8" Medium-Duty Attachment drives heavy-duty studs with inexpensive 22 cal. Power Loads.

R-4 3/8" Medium and Heavy-Duty Attachment. Uses both 22 and 32 cal. Power Loads. For toughest jobs.

offers greatest single-tool fastening versatility!

The Remington Stud Driver offers these exclusive features:

- Four fastening attachments for light, medium, heavy-duty work, including the special Captive Stud Attachment for extra-safe fastening. No other single tool can cover such a variety of applications.
- Medium-duty fastening—requiring 3/8" studs—can be done with low-cost 22 caliber Power Loads.
- Positive one or two-hand operation at operator's option . . . no buttons or release to hold while fastening.
- Greater variety of applications made possible with instantly interchangeable guards. These 4" square, hollow "safety guards" fit snugly over work, trap spall and dust. More than 40 types are available.

Send coupon for free booklet about the Remington Stud Driver—your best buy in powder-actuated fastening tools!

Remington

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Remington Arms Company, Inc., Bridgeport 2, Conn.
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Please send—without obligation—information on Remington Contractor & Industrial Equipment checked below:

☐ Stud Drivers ☐ Air Tools ☐ Chain Saws
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with HOSE-McCANN TELEPHONES
because no current is needed

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Transmission of speech is clear, distinct and absolutely static-free over a distance of 30 miles or more.

Photos depict phones installed by Fred Electric Co. of Mineola, N. Y. for Poirier & McLane Corporation, N.Y.C., engineers — contractors for construction of the Main Force Tunnel in Brooklyn. These phones were especially made from our basic Model SER with 6" bell, auxiliary horn and red indicator light.

Write for illustrated catalog S-1

HOSE-McCANN
TELEPHONE CO., INC.
25TH ST. & 3RD AVENUE, BROOKLYN 32, N. Y.
HYACINTH 9-1200

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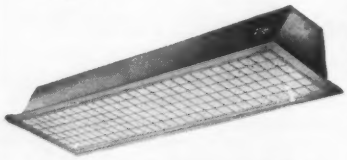
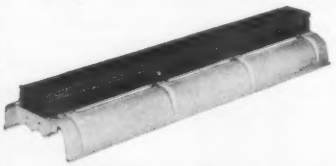
Specify...GOOD Luminaires





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ELECTRICAL ENCLOSURES

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Ideal for housing electrical controls, components and terminal strips. Note removable mounting panel. Neoprene gasket on door protects against dust, dirt, oil, water. Strong welded construction. No holes or open seams. Also available in NEMA types 1, 3, 4 and 5.

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Heavy gauge steel, welded seams. No knockouts or holes to leak oil, water or dust. Neoprene gasketed cover with screw clamp makes tight oil-proof seal. Available with or without removable panel. 8 stock sizes from 4"x4"x3" to 16"x14"x6".

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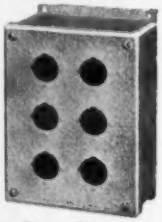

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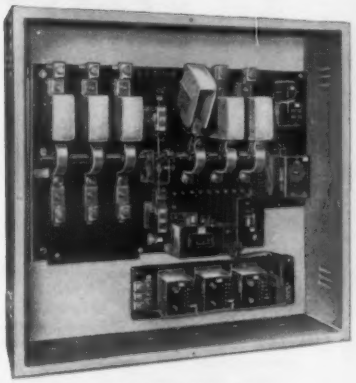

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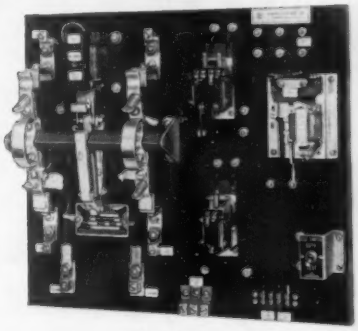

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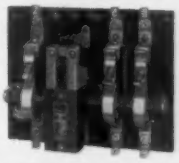
reliable power switching, rugged durable design.



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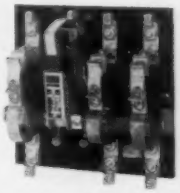

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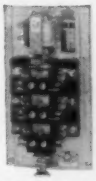

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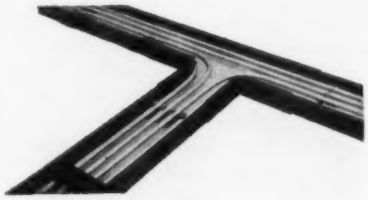

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Chalfant PRODUCTS CO. Inc.
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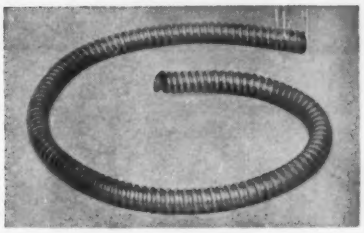
INTERNATIONAL Electrical Conduit



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(U. L. and J. I. C. Approved)

Strong, flexible metal core for simple, fast installation even in "U" bends and crowded quarters. Special polyvinyl cover is liquid-tight, abrasion-resistant and provides permanent protection against oil, grease, weather, water, dirt, chemicals, fumes and salt spray. Sealed Skin's Flexibility is especially adapted to provide connections between a moving member and stationary part and for resistance to vibration. It is easily cut to required lengths on the job. Made to meet U.L. or Joint Industry Conference (J.I.C.) requirements. Packaged in a handy "playout" carton.

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Made to Underwriters' and Canadian Standards Approval—meets all the rigid tests for flexible metal conduit conducted by Underwriters' Laboratories, Inc. Rust-resistant zinc coating gives longer protection against corrosion, dirt, fumes, spray, and superior finish "dresses up" installations. Automatic degreasing give oil-free conduit. Special built-in flexibility make installation easier—resists vibration—flexes into "U" bends—follows machine or installation contours. Especially adapted for connections between moving members and stationary parts. Comes in easy-to-handle coils tagged with Underwriters' and C.S.A. Label.

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Lower cost conduit for use where U.L. type is not necessary. Give extra flexibility with economy, provides unexcelled, low-cost, crush-resistant shielding for floor, wall, ceiling cables. Electroplated to give rust-resistant zinc coating. Superior finish "dresses up" installations. Automatic degreasing gives oil-free conduit. Easy to install—resists vibration—flexes into "U" bends and to follow machine or installation contours. Available in easy-to-handle coils.

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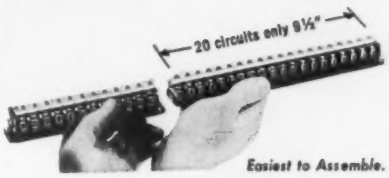
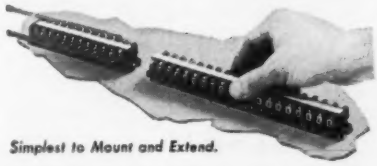


Easiest to Assemble.



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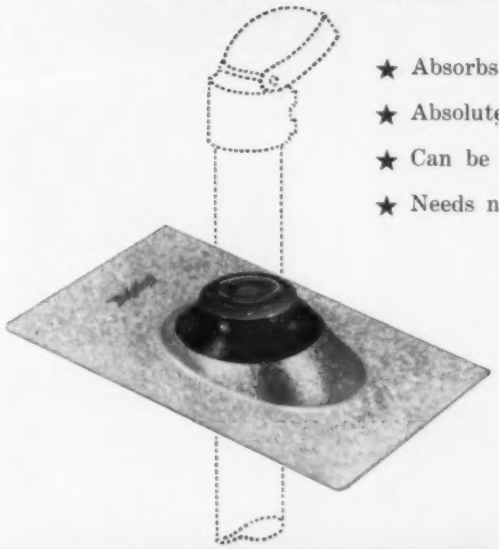

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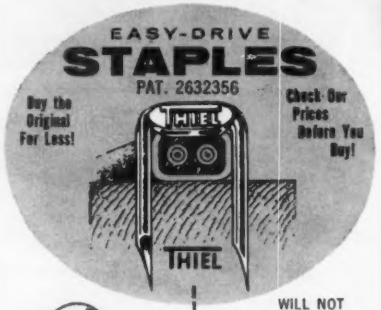

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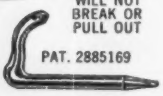

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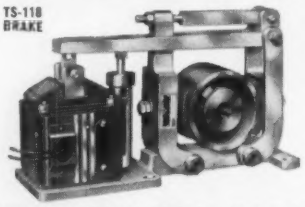

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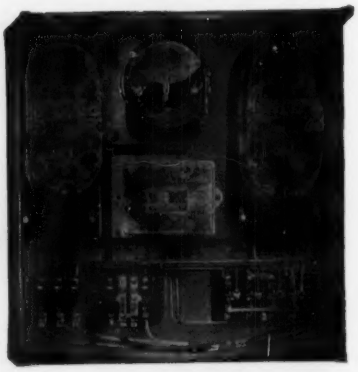

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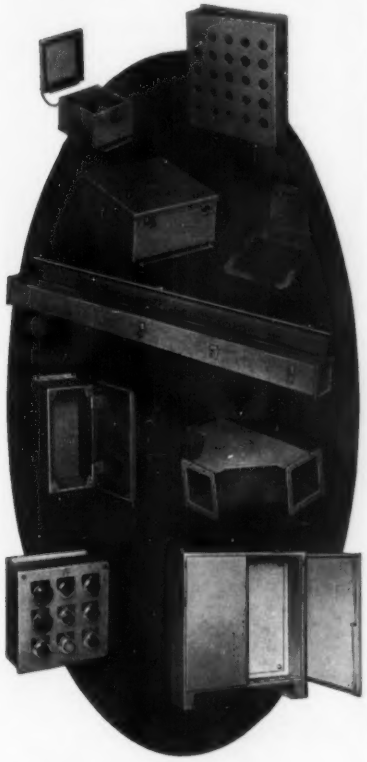

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KEYSTONE MANUFACTURING CO.

Division of Avis Industrial Corp.

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ZK BRIDGE

Single knob Wheatstone Bridge. Range: 40 milliohms to 50,000 ohms, six ranges, fast, accurate, handy. Bull. 630

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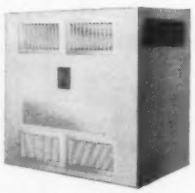

NIAGARA Ventilated Dry Type Transformers

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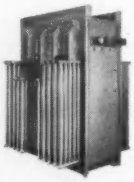

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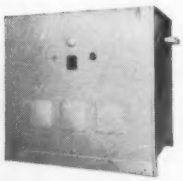

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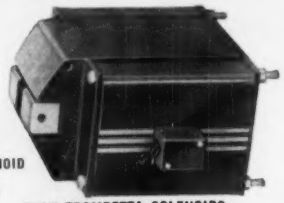

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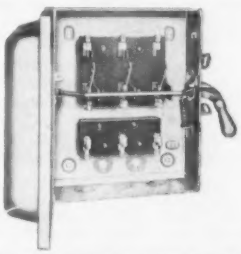

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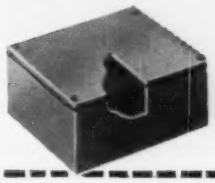
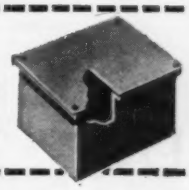
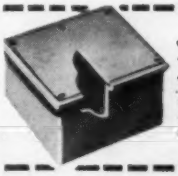


DUST-TIGHT AND WEATHER-PROOF
TYPE S
Surface mounted, 160 standard sizes plus others

WATERTIGHT AND SUBMERSIBLE
TYPE FF
Surface mounted, 95 standard sizes plus others





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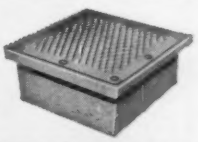
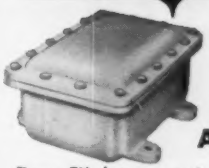
TYPE ER
Flush mounted, 53 standard sizes plus others

DUST-TIGHT AND WEATHERPROOF
TYPE SW
— Checkered cover sidewalk boxes, flush mounted, 55 standard sizes plus others



EXPLOSION-PROOF HOUSINGS



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Type EX boxes meet N.E.C. requirements for Class 1, Groups C & D hazardous locations. Standard construction includes extra-thick walls, highly machined flanges, great number and close spacing of cap screws, and minimum of 5 full thread conduit entrances. 112 standard sizes plus others. Made to Underwriters and Military Specifications.

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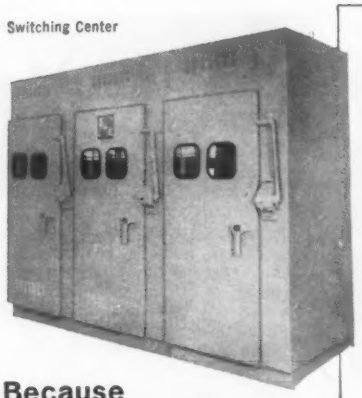
Switching Center



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Available in ½" ¾" and 1" sizes

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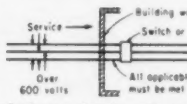
CODE RULES ON HIGH-VOLTAGE SERVICES


Building wall
Service
Switch or CB
Over 600 volts
All applicable sections of Art. 230 must be met for high voltage service.

Conductors and equipment for services rated over 600 volts between conductors must basically comply with applicable sections of Article 230 on services up to 600 volts. It should be noted that, for purposes of code application, secondary conductors, not the primary conductors, are regarded as constituting the service conductors to the building proper where: (A) Step-down transformers are located outdoors; (B) Step-down transformers are located in a separate building from the one served; or (C) Step-down transformers are located in the building served, in a transformer vault meeting code rules on construction of such vaults and under sole control of the supply company.

Chapters are broken down on the basis of types of equipment to facilitate ready reference: lighting equipment — motors and controllers — conductors — raceways — switches — overcurrent protective devices — switchboards and panelboards — transformers — capacitors and regulators — power sources — high voltage — signals and communications.

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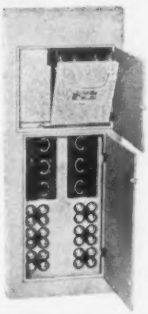

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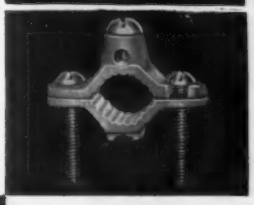

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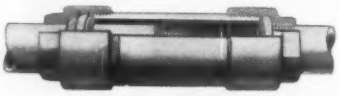
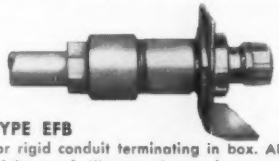


TYPE EF for rigid conduit. Allows 8", 12" or more expansion and contraction.

TYPE TF for thin wall (EMT) conduit. Allows 4" expansion and contraction.



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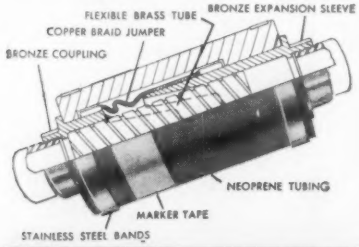

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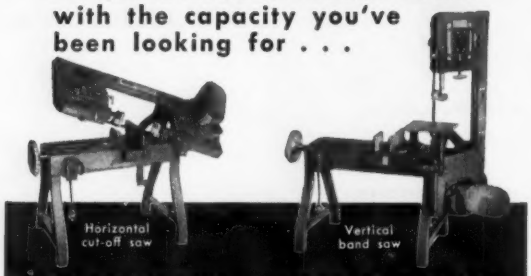

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250 SERVICE RD. — THREE RIVERS, MICHIGAN

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by J. F. McPartland and the Editors of
Electrical Construction and Maintenance

Here's a modern, comprehensive reference and instruction manual on the methods and techniques used in constructing systems for power, light, signals and communications. Covering the best practice on selecting, mounting, connecting and housing all types of electrical equipment, this manual presents 1959 National Electrical Code data relating to installation. And a wealth of special illustrations are used throughout to clarify fine code points.

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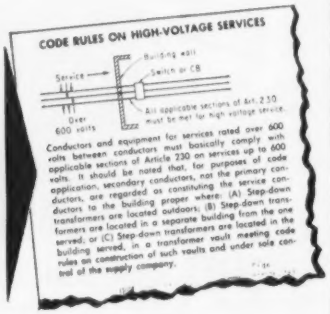
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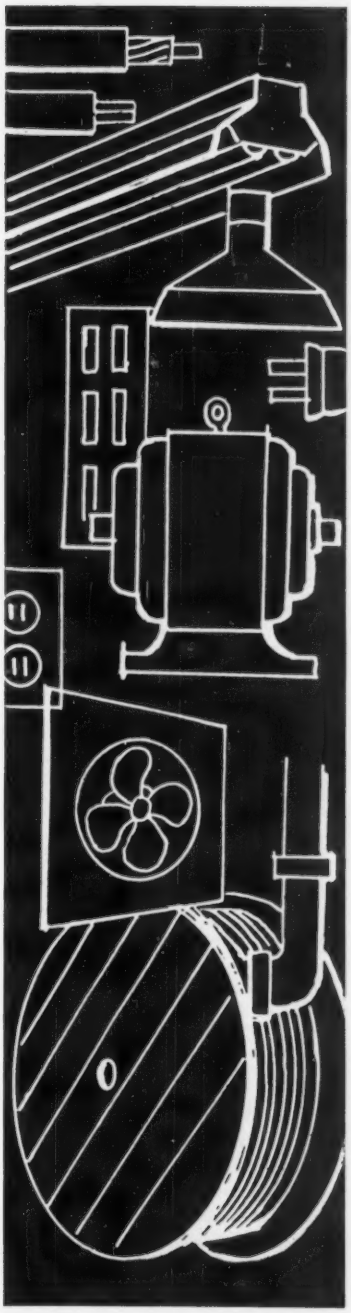

Classified listings of manufacturers of electrical products

Products in this section are arranged under the following 12 major sections:

1. **Power Transmission Line Equipment**
2. **Transformation & Conversion Eqpt.**
3. **Switching & Control Equipment**
4. **Protective Equipment**
5. **Wiring Devices & Boxes**
6. **Conductors & Connectors**
7. **Raceway**
8. **Motors & Generators**
9. **Lighting Equipment**
10. **Signal, Communication & Indicating Eqpt.**
11. **Heating & Cooling Equipment**
12. **Tools & Supplies**

Each of these sections is further broken down into individual classes of equipment. For example: Section 1, "Power Transmission Line Equipment", includes (A) CONDUCTOR SUPPORTING STRUCTURES, (B) LINE TRUCKS & MOBILE EQUIPMENT, (C) MANHOLE EQUIPMENT, and (D) POLE EQUIPMENT.

Where applicable, these classes are further subdivided. CONDUCTOR SUPPORTING STRUCTURES, for instance, include (1) Crossarms, (2) Poles, and (3) Towers. Companies manufacturing crossarms would be followed by a (1) in parentheses; those manufacturing poles would be followed by a (2); those manufacturing both would be followed by (1-2), etc.

The symbol (●) indicates that detailed information concerning the product may be found on the page indicated after the listing.

Technical Literature

Manuals, bulletins and other reference material on electrical products are listed following each of the twelve product classifications of the Product Directory. They may be obtained without cost or obligation by filling in the requested information on one of the Free Information cards on page 181.

PRODUCT INDEX

Manufacturers of equipment and materials normally used in electrical construction, plant operations and motor service work are listed in the Product Directory beginning on page 151. To find any specific product in this directory, locate the product first in the comprehensive alphabetical index below.

For example, this index shows "Cartridge fuses" to be listed under 4B. Turn to Section 4 and find "Cartridge fuses" as number 1 under "4B. Fuses". Companies listed under "Fuses" which are followed by the bracketed number (1) make cartridge fuses. Bold-face listings refer to advertising pages containing additional information.

A

Adapter removers, fuse 4C
Adapters, conduit bushing 7E
Adapters, grounding 5B
Adapters, socket 5C
Adhesive labels 12N
Adjustable floors 7C
Agitator-drive motors 8D
Air conditioners 11E
Air gap gauges 12E
Air handling equipment 11F
Air ionizers 11F
Air purifiers 11F
Aircraft motors 8D
Airport cable 6D
Airport lighting 9D
Alarms ..... 10B, D, E
Alarms, burglar 10D
Alarms, fire 10E
Alarms, intrusion 10D
Alloy conduit 7D
Alternators 8G
Aluminum conduit 7D
Aluminum EMT 7F
Aluminum fittings 7E
Ammeters 10A
Amplifiers, magnetic 3K
Analyzers, circuit 10C
Analyzers, protective device 10C
Analyzers, system 10C
Anchors, earth 1D
Anchors, pole line 1D
Anchors, wall 12K
Annunciator wire 6D
Annunciators 10B
Antenna outlets 5B
Antenna systems 10F
Appliance cord sets 6E
Appliance switches 3J
Appliance wire & cable 6D
Arbor presses 12J
Arc lamp transformers 2B
Arc lamps 9F
Arc lighting equipment 9C
Argon lamps 9G
Armature balancers 12E
Armature banders 12E
Armature banding 12V
Armature fields 12P
Armature holders & stands 12E
Armatures 12P
Arresters, lightning 4E
Asbestos-cement conduit 7D
Asbestos insulation 12Q
Asbestos tape 12S
Asbestos tubing 12T
Assemblies, multi-outlet 5B
Attachment caps & bases 5B
Automatic transfer switches 3G
Automotive motors 8D
Autostarters 3M
Autotransformer starters 3M
Autotransformers 2A, 2B
Auxiliary gutters 7A

B

Bags, tool 12A
Balancer sets 8F
Balancers, motor 12E
Ball bearings 12P
Ballast thermal protectors 4E
Ballasts, lamp 5C
Banders, armature 12J
Banding, armature 12V
Banding twine 12V
Barn wire 6D
Bars, commutator 12P
Bars, tamping 12A
Baseboard electric heaters 11A
Bases, attachment 5B
Bases, fuse cutout 4C
Bases, motor & generator 12P
Bathroom heaters 11A
Batteries 2E
Battery accessories 2G
Battery chargers 2F
Battery-operated fluorescent fixtures 9C
Battery switches 3J
Bayonet sockets 5C
Beacons 9D
Beads, insulating 12U
Beam clamps 6G
Bearing installers & extractors 12J
Bearings, motors & generator 12P
Bed lamps 9A
Beeswax 12V
Bells 10G
Bench lights 9E
Benders, conduit & EMT 12C
Benders, metal 12J
Benders, strand & cable 12B
Bending gauges 12C
Bending machine pumps 12C
Bevelers, pipe 12C
Bin level indicators 10B
Binding posts 6F
Bins, parts storage 12D
Bins, truck 12D
Bipost sockets 5C
Blanks, knockout 5E
Blocks, cable-pulling 12B
Blocks, connecting 6F
Blocks, fuse 4C
Blocks, terminal 6F
Blowers 11F
Blowers, portable 12J
Blown fuse alarms 10B
Bodies, conduit 7E
Bodies, cord connection 5B
Bodies, truck 1B, 12D
Boilers, steam (electric) 11C
Bolt-sealing compound 12K
Bolts, expansion 12K
Bolts, toggle 12K
Borers, earth 1B
Boring tools, hand 12J
Boundary alarms 10D
Box hardware 5E
Box-to-conduit connectors 7E
Boxes, junction—pole base 5D
Boxes, terminal—motor & generator 12P
Boxes, wiring 5D
Braces, trench 1C
Brackets, transformer mounting 2A
Brackets, wall lighting 9A
Brake motors 8D
Brakes, electric 3K
Brazing transformers 2B
Breakers, circuit 4D
Brewery cable 6D
Bridge cable 6D
Bridge lamps 9A
Bridge lighting 9D
Bridges, measurement 10C
Bridle rings 6G
Brush holders 12P
Brush plating equipment 12J
Brush seaters 12E
Brushes, motor & generator 12P
Buckets, tool 12A
Building wire & cable 6D
Bulbs, lamp 9G
Burglar alarms 10D
Burnishers, contact 12L
Bus drop cable 6D
Busbar & supports 6H
Bushing adapters 7E
Bushings, conductor supporting 6G
Bushings, conduit 7E
Bushings, motor 12P
Bushings, sealing 7E
Bushings, strain relief 6G
Bushings, transformer 2A
Busway 7B
Buzzers 10G

C

Cabinet convectors 11A
Cabinets, equipment enclosing 5F
Cabinets, parts storage 12D
Cable ..... 6A to 6E
Cable benders 12B
Cable connectors 5E, 6F
Cable drive-rings 6G
Cable duct shields 1C
Cable, electric heating 11A
Cable hangers 1C, 6G
Cable locators 10C
Cable pay-out reels & turntables 12A
Cable racks, hangers, arms, hooks and extensions (manhole) 1C
Cable sealing compound 12V
Cable spacers 6G
Cable splices & splicing equipment 6F
Cable tags 12V
Cable ties 6G
Cable-to-box connectors 5E
Cable-to-cable connectors 6F
Cable trays 6G
Cable, wire & cord ..... 6A, B, C, D, E
Cable & wire supports 1C, 6G
Cable & wire tools 12B
Cable wrapping 12U
Calling systems 10F
Cambric insulation 12Q
Canopy switches 5A
Canvas, varnished 12U
Capacitor protective gaps 4E
Capacitors, fluorescent lamp circuit 5C
Capacitors, motor start 12P
Capacitors, power-factor correcting 3P
Caps, attachment 5B
Caps, service entrance 7E
Carbon brushes 12P
Carrier system controls 3K
Cartridge fuses 4B
Cartridge heaters 11C
Carts, reel 12B
Catenary supports 1D
Cathodic protection cable 6D
Cathodic protection equipment 4E
Ceiling heating cable & panels 11A
Cellophane tape 12R
Cellular-floor raceway 7C
Cellulose acetate tape 12S
Cement, commutator 12V
Cement, insulating 12U
Central furnaces, electric 11A
Central industrial control systems 3K
Centrifugal switches 3H
Chain, lighting fixture 5B
Changers, lamp 12L
Changers, transformer tap 2A
Channel, cable-supporting 6G
Chargers, battery 2F
Charging controls, battery 3J
Charge neutralizers & eliminators 12N
Cheeks, coil 12F
Chemical wire stripper 12V
Chests, tool 12D
Chimes 10G
Church lighting 9C
Circle cutters 12M
Circuit analyzers 10C
Circuit breaker cabinets 5F
Circuit breaker testers 10A
Circuit breakers 4D
Circuit testers 10A
Circulating fans 11F
Clamps, beam 6G
Clamps, conduit 7E
Clamps, fuse clip 4C
Clamps, ground 4F
Clamps, wire & cable 6G
Clay conduit 7D
Clay duct dowel pins 1C
Cleaner, fuse clip 4G
Cleaners, vacuum 12J
Cleaning compound 12V
Cleats, wire & cable 6G
Climbing equipment 12A
Clip clamps & reducers, fuse 4C
Clip cleaner, fuse 4G
Clips, cable-supporting 6G
Clips, fuse 4C
Clips, test 12L
Clock systems 3K
Closed circuit television 10F
Cloth, duck 12U
Cloth, insulating 12U
Clothing, protective 12A, 12W
Clutches, electric 3K
Coil testers 10G
Coil tools & equipment 12F
Coiled cords 6E
Coils, motor & generator 12P
Coils, solenoid & magnet 12V
Cold cathode lamps 9F
Cold cathode lighting fixtures 9C
Collecting rings & shoes 6F
Colored lamps 9G
Commercial lighting 9C
Communication cable 6D
Communication systems 10F
Commutator bars 12P
Commutator cement 12V
Commutators 12P
Compensators, motor 3M
Compound, bolt-sealing 12K
Compound, cable sealing 12V
Compound, cleaning 12V
Compound, conduit sealing 7E

Compound, fireproofing 12V
Compound, heat-conducting 12V
Compound, impregnating 12V
Compound, insulating 12U
Compound melting pots 12J
Compound, screw-anchoring 12K
Compound, splicing 12V
Compound, wire-pulling 12V
Compound, wire-stripping 12V
Concrete boxes 5D
Concrete floor raceway systems 7C
Concrete inserts 12K
Conditioners, air 11E
Conductor rails 6J
Conductor supporting structures (outdoor) 1A
Conductor supports 6G
Conductor systems, enclosed (trolleys) 7J
Conductors ..... 6A, B, C, D, E
Conduit 7D
Conduit fittings & bodies 7E
Conduit, flexible metallic 7G
Conduit pushing pumps 12C
Conduit racks 12C
Conduit, thinwall 7F
Conduit tools 12C
Connecting blocks 6F
Connection bodies, cord 5G
Connector tools, cable 12B
Connectors, cable-to-box 5E
Connectors, cable-to-cable 6F
Connectors, conduit-to-box 7E
Connectors, ground 6F
Contact burnishers 13L
Contactors, magnetic 3M
Contacts, controller 12V
Continuity testers 10C
Control cable 6D
Control centers, motor 3M
Control panels 3D
Control switchboards 3C
Control switches 3H
Control transformers 2B
Controller contacts and fingers 12V
Controllers, drum 3M
Controllers, electric fence 3J
Controllers, motor 3M
Controls, heating 3J
Controls, motor 3M
Controls, welding 3J
Convenience outlets 5B
Converters 2D
Copper oxide rectifiers 2C
Cord connection devices 5G
Cord, flexible 6C
Cord sets 6E
Cord switches 3H
Corona testers 10C
Corrosion preventives 12V
Cotton sleeving 12T
Cotton tape 12S
Couplings, conduit 7E
Counters, revolution 10B
Counting devices 10B
Cover hooks, manhole 1C
Covers, box 5E
Covers, manhole 1C
Crane controls 3J
Crane motors 8D
Crepe paper tape 12S
Crossarm hardware 1D
Crossarms 1A
Current-failure alarms 10B
Current-limiting busway 7B
Current-limiting fuses 4B
Current-limiting reactors 4E
Current-limiting resistors 3P
Current-limiting transformers 2B
Cutout cabinets 5F
Cutout-operating mechanisms 3J
Cutouts, high-voltage fuse 4A
Cutouts & holders, low-voltage fuse 4C
Cutouts, thermal 4E
Cutters, circle 12M
Cutters, commutator 12E
Cutters, conduit & EMT 12C
Cutters, insulation 12G
Cutters, metal 12M
Cutters, wire & cable 12B

D

Dating nails, pole 1D
Dead-ends 1D
Dead-front switches 3G
Decals 12N
Decorative lamp bulbs 9G
Dehumidifiers 11G
Delayed-action switches 5A
Demagnetizers 12J
Demand meters 10A
Desk lamps 9A
Detectors, fire alarm 10B
Detectors, ground 10A
Detectors, metal & outlet 10C
Dielectric heaters 11C
Dielectric testers 10C
Dies, conduit threading 12C
Diesel generators 8F
Diffusers, lighting 9H
Diggers, pole-hole 12A
Dimmers, lamp 3J
Dinkies, pole 1B
Discharge lamps 9F
Disconnect sticks 12A
Disconnect-type hangers 5G
Disconnect switches 3M
Display lighting 9C
Display turntables 12N
Disposal units, lamp 12J
Distribution panels 3D
Ditchers 1B
Doctors' registers 10F
Door & gate openers 3J
Door switches 5A
Doormat switches 3H
Dowel pins, clay duct 1C
Drilling tools 12M
Drip-proof motors 8C
Drive-rings, cable 6G
Drivers, wedge 12G
Drives, power 12C
Drives, variable speed 8J
Driveway lights 9A
Drum switches & controllers 3M
Dry cells 2E
Dryer cords 6E
Dryer receptacles 5B
Duck cloth 13U
Duct heaters, electric 11A
Duct pins 1C
Duct shields 1C
Duct, trolley 7B
Duct, underfloor 7K
Duct, wiring 7D
Dummy fuse plugs 4C
Dust-tight lighting fixtures 5C
Dynamic balancers 12E
Dynamometers 10C
Dynamos 8G
Dynamotors 8G

E

EMT 7F
Earth boring trucks 1B
Ebony 12U
Edgers, insulation 12G
Elapsed-time indicators 12B
Elbows, conduit 7E
Electric brakes 12L
Electric drills 12M
Electric fence controllers 3J
Electric fence wire 6D
Electric furnace cable 6D
Electric furnaces 11C
Electric heating equipment ..... 11A, B, C
Electric locks 3K
Electric metallic tubing 7F
Electric ovens 11C
Electric plants 8F
Electric process heaters 11C
Electric saws 12M
Electric space heaters 11A
Electric steam boilers 11C
Electrical tape 12R
Electroluminescent panels 9J
Electrolysis meters 10A
Electromagnets 3K
Electroplating controls 3J
Electroplating devices 12J
Electrostatic meters 10A
Elements, heating 11C
Elevator cable 6D
Elevator motors 8D
Eliminators, static 12N
Emergency generators 8F
Emergency lighting equipment ..... 9C, E
Enclosures, metal 3E, 5F
Enclosures, trolley wire 5F
End seals, cable 6F
Ends, dead 1D
Engine-powered generators 8F
Engravers 12J
Enlargers, conduit 7E
Entrance heads & hardware 7E
Environment-resistant connectors 6F
Equipment switches 3J
Estimating service 12X
Etchers 12J
Excitation busway 7B
Exciters 8H
Exhaust fans 11F
Exit lights 9C
Expansion bolts, shields & anchors 12K
Expansion fittings, conduit 7E
Experimental switchboards 3C
Explosion-proof boxes 5D
Explosion-proof circuit breakers 4D
Explosion-proof lighting 9C
Explosion-proof motors 8C
Explosion-proof panelboards 3D
Explosion-proof plugs & receptacles 5B
Explosion-proof switches 3G
Explosion-proof unions 5E
Extension cords 6E
Extension cords with lamps 9E
Extractors, gear & bearing 12J
Eyeshields 12W

F

Face shields 12W
Fan motors 8D
Fans 11F
Fans & lighting fixtures, combined 11F
Fasteners & fastening devices 12K
Fault indicators 10B
Fault locators 10C
Fence alarms 10D
Fence controllers 3J
Fiber conduit 7D
Fiber & fiberboard insulation 12Q
Fiber-glass tape 12S
Fiber sleeving & tubing 12T
Field discharge switches 3K
Fields, stator & armature 12P
Filament lamps 9G
Files, slot 12E
Fingers, controller 12V
Fire alarm detectors 10B
Fire alarms 10E
Fireproofing compound 12V
Fish paper 12Q
Fish tape or wire 12B
Fittings, conduit 7E
Fittings, expansion 7E
Fittings, service entrance 7E
Fittings, weatherproof 5B
Fixture hangers & supports 5B
Fixture supports & raceway, combined 7H
Fixture wire ..... 6B, D
Fixtures, lighting ..... 9A to 9E
Flame safeguard equipment 3K
Flashers & controls 3H
Flexible cord 6C
Flexible metallic conduit 7G
Flexible metallic conduit fittings 7E
Flexible shafts 12P
Flexible sleeving 12T
Float switches 3H
Floodlights 9D
Floodlights, garden 9A
Floor boxes 5D
Floor furnaces 11A
Floor heating cable 11A
Floor lamps 9A
Floor mats, heated 9A
Floor outlet nozzles 5E
Floor raceway systems 7C, 7K
Floors, adjustable 7C
Flow switches 3H
Fluorescent lamp changers 12L
Fluorescent lamp disposal units 12J
Fluorescent lamps 9F
Fluorescent unit testers 10C
Flux, soldering & welding 12V
Fluxmeters 10A
Folders, insulation 12G
Foot switches 3H
Footmat switches 3H
Forced-air heaters, electric 11A
Formers, insulation 12G
Forms, coil 12F
Fractional-horsepower motors 8A
Frames, manhole 1C
Frames, motor & generator 12P
Framing angle 12D
Framing, cable-supporting 6G
Framing, metal 3E
Frequency changers 2D
Frequency controls 3K
Frequency meters 10A
Friction tape 12R
Fullerboard 12Q
Furnace cable 6D
Furnace control transformers 2B
Furnaces, electric space heating 11A
Furnaces, industrial electric 11C
Fuse accessories 4C
Fuse adapter removers 4C
Fuse alarms & indicators 10B
Fuse cabinets 5F
Fuse clip cleaner 4C
Fuse cutouts, blocks & holders 4C
Fuse cutouts, high voltage 4A
Fuse pullers 12L
Fused quarts 12U
Fused taps & plugs 5B
Fuses 4B

G

Gages, wire 12B
Galvanometers 10A
Gap gauges 12E
Garden lights 9A
Gas tube sign cable 6D
Gas-turbine generators 8F
Gaseous-discharge lamps 9F
Gaskets, conduit fitting 7E
Gasoline-engine-driven generating sets 8F
Gate & door openers 3J
Gauges, air gap 12E
Gear installers & extractors 12J
Gearmotors 3D
Generating sets 8F
Generator controls 3J
Generator replacement parts 12P
Generators 8G
Germanium rectifiers 2C
Gimbal rings 9H
Gins, transformer 12A
Glass fiber insulation 12Q
Glass fiber tape 12S
Glass tube fuses 4B
Glassware, lighting 9H
Glow lamps 9F
Glue pots 12J
Goggles 12W
Gongs 10G
Goosenecks 7E
Grapples, conduit tool 12C
Grinders, commutator 12E
Grips, cable-pulling 12B
Grips, cable-supporting 6G
Grips, fish tape 12B
Ground clamps 6F
Ground detectors 10B
Ground resistance testers 10C
Ground rods 4E
Ground wire 6D
Ground wire molding 7H
Grounding adapters, cord-connecting 5B
Grounding equipment, pole line 1D
Grounding transformers 2B
Growlers 10C
Guard rails, manhole 1C
Guards, conduit thread 7E
Guards, lamp 5C
Guides, cable & wire pull-in 12B
Guns, soldering 12H
Guns, staple 12B
Guns, wire installation 12B
Gutters, auxiliary 7A
Guys—pole line 1D

H

Hammer-actuated tool fasteners 12K
Hammers, electrician's 12L
Hammers, power-driven 12M
Hand tools 12L
Hand trucks 12D
Hangers, box 5E
Hangers, cable 1C,6G
Hangers, conduit 7E
Hangers, lighting fixture 5B
Hangers, manhole cable 1C
Hardware, box 5E
Hardware, pole & crossarm 1D
Heads, coil 12F
Heads, service entrance 7E
Heat-conducting compounds 12V
Heat pumps 11B
Heated floor mats 11A
Heater wire & cable 6D
Heaters, electric space 11A
Heaters & lighting fixtures, combined 11A
Heaters, soldering gun or iron 12H
Heating cable .....11A, C
Heating controls 3J
Heating elements & devices 11C
Heating transformers 2B
Heavy-duty switches 3H
Hermetic motors 8C
Hickeys, box 5E
Hickeys, conduit & EMT 12C
High-frequency busway 7B
High-frequency generators 8E
High-frequency motors 8B
Highway lighting 9D
Hoist motors 8D
Hoisting equipment, pole line 12A
Hoists 12D
Holders, armature 12E
Holders, brush 12P
Holders, fuse 4C
Holders, lamp 5C
Holders, soldering gun & tool 12H
Holders, tool 12A, 12L
Hole saws 12M
Hoods, range 11F
Hooks, lacing 12F
Hooks, manhole cover 1C
Horns 10G
Hospital signals 10F
House numbers, illuminated 9A
Housings & cabinets 5F
Hot line tools 12A
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I

Identification nameplates 12J
Ignition transformers 2B
Illuminated house numbers 9A
Immersion heaters 11C
Impact wrenches 12L
Impregnating compound 17A
Impregnators, coil 12D
In-and-out registers 10F
Incandescent lamp changers 12L
Incandescent lamps 9G
Indenters, conduit fitting 12C
Indicating & pilot lights 9C
Indicators 10B
Induced draft fans 11F
Induction heaters 11C
Induction motors 8B
Industrial control systems 3K
Industrial lift trucks 12D
Industrial lighting 9C
Industrial television 10F
Infrared heaters 11C
Infrared lamps 9G
Insect-repellent lamps 9G
Inserts, concrete 12K
Inserts, threaded 12K
Inspection lights 9E
Installers, gear & bearing 12J
Institutional lighting 9C
Instrument motors 8D
Instrument transformers 2B
Instruments, indicating 10A
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Insulating materials .....12Q to 12U
Insulating paint 12U
Insulation products, porcelain 12U
Insulation testers 10C
Insulation tools 12G
Insulators, interior wiring 6G
Insulators, pole line 1D
Intercom systems 10F
Interlocks 3K
Interval timers 3H
Intrusion alarms 10D
Inverters 2D
Ionizers, air 11F
Irons, pulling-in 1C
Irons, soldering 12H
Isolating shock mounts 12N
Isolating switches 3G
Isolating transformers 2B

J

Jacks, cable-pulling 12B
Jacks & jack screws 12D
Jacks, pole line 12A
Junction boxes 5D
Junction boxes, pole base 5D

K

Kettles, melting 12J
Key-operated switches 5A,3H
Kilowatt-hour meters 10A
Kits, cable-splicing 6F
Knife switches 3G
Knives, cable sheath-splitting 12B
Knobs, wire & cable 6G
Knockout blanks 5E
Knockout punches 12C
Kraft paper 12Q
Kva meters 10A

L

Labels, adhesive 12N
Laboratory switchboards 3C
Lacing hooks 12D
Lacing twine 12V
Ladders 12D
Ladders, conductor-supporting 6F
Ladders, manhole 1C
Lamp accessories 9C
Lamp bulbs 9G
Lamp changers 12L
Lamp dimmers 3J
Lamp disposal units 12J
Lamp-failure indicators 10B
Lamp sockets & holders 5C
Lamp wire 6D
Lamps, floor and table 9A
Lamps, fluorescent 9F
Lamps, incandescent 9G
Lamps, portable 9A,9E
Lamps, trouble 9E
Lanterns, post 9A
Lead wire 6D
Leaders, fish tape 12B
Leads, test 12L
Leads, water-cooled 6D
Level indicators 10B
Lift trucks 12D
Lift & towers, mobile 1B
Lifting magnet connectors 6F
Lifts, wire reel 12B
Light dimmers 3J
Light meters 10A
Lighting fixtures .....9A to 9E
Lighting fixtures & fans, combined 11F
Lighting fixtures & heaters, combined 11A
Lighting glassware, louvers & reflectors 9H
Lighting standards 9D
Lightning protective equipment 4E
Lights, night 9A
Limit switches 3H
Line hardware 1D
Line splices 1D
Line trucks 1B
Linemen's protective clothing 12A
Linemen's tools 12A
Links, high-voltage fuse cutout 4A
Links, renewable fuse 4C
Liquid-flow-activated switches 3H
Liquid-flow indicators & alarms 10B
Liquid-level alarms 10B
Liquid-level switches & controls 3H
Liquid-tight flexible metallic conduit 7G
Load centers 3M
Load indicators 10B
Load resistors 3P
Locator systems 10F
Locators, ground 10C
Locators, metal & outlet 10C
Locking-type caps & receptacles 5B
Locknuts, conduit 7E
Locks, lamp 5C
Louvers, lighting fixture 9H
Low-resistance testers 10C
Low-voltage control systems 3L
Lubricant, thread 12V
Lubricant, wire-pulling 12V
Lugs, wire & cable 6F
Lumiline cap switches 5A
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M

Machine accessories 12M
Machine lights 9E
Machine process controls 3K
Machine tool cable 6D
Machine tool transformers 2B
Machines, soldering 12H
Magnet coils 12V
Magnet wire 6D
Magnetic amplifiers 3K
Magnetic brakes 3K
Magnetic contactors & starters 3M
Magnetizers 12J
Magnetos 10C
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Maintenance trucks 12D
Mandrels, conduit 12C
Manhole equipment 1C
Manual starters 3M
Marine lighting 9D
Marine motors 8D
Marine wire & cable 6D
Markers, conduit 7E
Markers, pole 1D
Markers, wire & cable 12V
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Masks, face protective 12W
Masonry anchors 12K
Masonry drills 12M
Master antenna systems 10F
Masts, service entrance 7E
Mat-operated switches 3H
Material pricing service 12X
Materials handling equipment 12D
Mats, floor, heated 9A
Mats, switchboard 12U
Measurers, conduit 12C
Measurers, wire 12B
Mechanical rectifiers 2C
Mechanisms, switch-operating 3J
Melting pots 12J
Mercury control switches 3H
Mercury light switches 5A
Mercury-turbine generators 8F
Mercury-vapor fixtures 9C
Mercury-vapor lamps 9F
Metal benders 12J
Metal cutters & shears 12M
Metal locators 10C
Metallizers 12J
Meter cabinets 5F
Meter seals 12V
Meter sockets & mountings 5H
Meter testers 10A
Metering & control switchboards 3C
Meters 10A
M-G sets 8F
Mica insulation 12Q
Miniature lamps 9G
Miniature switches 3H
Mining machine motors 8D
Mobile towers 1B
Molded-integral cord sets 6E
Molding, ground wire 7H
Momentary-contact switches 5A
Motor balancers 12E
Motor brushes 12P
Motor control centers 3M
Motor controls 3M
Motor-generators 8F
Motor oilers 12J
Motor overload protectors 4E
Motor replacement parts 12P
Motor single-phasing protection 4E
Motor speed controls 3M
Motor-starting capacitors 12P
Motors .....8A to 8D
Mounting brackets, transformer 2A
Mountings, meter 5H
Mounts, shock-isolating 12N
Multi-outlet assemblies 5B

N

Nails, pole-dating 1D
Nameplates 12N
NEC cable designations 6A,B,C
Neon lamps 9G
Neon testers 10C
Network protectors 4E
Neutralizers, static charge 12N
Night lights 9A
Nipples, conduit 7E
Non-metallic boxes 5D
Nozzles, floor outlet 5E
Nurses' call systems 10F
Nuts, wire 6F

O

Obstruction lighting 9D
Ohmmeters 10A
Ohmstone 12U
Oil burner motors 8D
Oil burner switches 5A
Oil fuse cutouts 4A
Oil switches 3G
Oilers, motor 12N
Open-link fuses 4B
Openers, door & gate 3J
Oscilloscopes 10C
Outdoor lighting 9A,9D
Outlet boxes 5D
Outlet locators 10C
Outlet nozzles, floor 5E
Outlets, convenience 5B
Outlets, television antenna 5B
Outlets, weatherproof 5B
Ovens, electric 11C
Overload protectors, ballast 4E
Overload protectors, motor 4E

P

PAR lamps 9G
Pad plating equipment 12J
Paging systems 10F
Paint, insulating 12U
Panelboard cabinets 5F
Panelboards 3D
Panels, distribution 3D
Panels, electric heating 11A
Panels, electroluminescent 9A
Panels, lighting fixture 9H
Panels, service entrance 3D
Paper insulation 12Q, 12U
Parking lot lighting 9D
Parkway cable 6D
Parts storage equipment 12D
Paste, soldering 12V
Pathway lights 9A
Patio lights 9A
Peak load controls 3K
Peak load indicators 10B
Pendant switches 5A

Permanent magnets 3K
Phase angle meters....10A
Phase converters 2D
Phase sequence indicators....10B
Phase-shifting transformers 2B
Photoelectric controls 3H
Photoelectric indicators & alarms....10B
Photographic (arc) lighting....9C
Pickups, conduit tool....12C
Pike poles 12A
Pilot light assemblies....9C
Pins, clay duct....1C
Pipe benders 12C
Pipe-heating cable 11C
Pipe pushers 12C
Pipe-thawing transformers 2B
Pipe vises 12C
Plants, power-generating 8F
Plastic-coated conduit 7D
Plastic-coated EMT....7F
Plastic conduit 7D
Plastic conduit fittings....7E
Plastic insulation 12Q
Plastic sleeving 12T
Plastic tape 12R
Platers 12J
Plates, switch & outlet box....5E
Platforms, pole 1D
Platforms, work 12D
Plating equipment 12J
Pliers, electrician's 12L
Plug fuses 4B
Plug-in bushway 7B
Plugs, attachment 5B
Plugs, conduit-sealing 7E
Plugs, dummy fuse....4C
Plugs, fused 5B
Plugs, knockout 5E
Polarity testers 10C
Pole base boxes....5D
Pole equipment 1D
Pole-hole diggers 1B, 12A
Pole jacks 12A
Pole-setting trucks 1B
Poles, pike 12A
Poles, lighting 9D
Poles, power line 1A
Poles, street lighting 9D
Polyester film insulation....12Q
Polyester tapes 12S
Polyethelene tapes 12S
Polyphase motors 8B
Porcelain insulating products 12U
Portable air conditioners....11E
Portable blowers 12J
Portable cord sets 6E
Portable electric heaters....11A
Portable electric saws & drills 12M
Portable emergency lighting 9E
Portable fans 11F
Portable heavy-duty switches 3H
Portable lamps 9A, 9E
Post lanterns 9A
Posts, binding 6F
Potentiometers 10A
Potheads 6F
Pots—melding, glue & compound....12J
Pots, solder 12H
Pouches, tool 12A, 12K
Powder-actuated fastening tools 12K
Powder plating equipment....12J
Power cord switches....3H
Power drives 12C
Power factor capacitors....3P
Power factor meters....10A
Power generating sets....8F
Power switches 3G
Power tool motors....8D
Power tools 12M
Power wire & cable....6A
Preheaters, wire 11C
Preservative, wood 12V
Pressboard 12Q
Presses, arbor 12J
Pressure-connector tools 12B
Pressure connectors 6F
Pressure-sensitive tape 12R
Pressure switches 3H
Preventives, rust & corrosion 12V
Pricing service 12X
Primary batteries 2E
Primary switches 3F
Private telephone systems 10F
Process controls 3K
Program clock systems....3K
Protection, cathodic 4E
Protective clothing 12A, 12W
Protective device analyzers 10C
Protective enclosures, trolley wire....5F
Protective equipment (clothing) 12W
Protective equipment (electrical) 4A, B, C, D, E
Protective gaps, capacitor 4E
Protective relays 3N
Protectors, ballast 4E
Protectors, motor overload....4E
Protectors, network 4E
Protectors, single-phasing 4E
Proximity controls and switches....3H
Pruners, tree 12A
Public address systems....10F
Public building lighting 9C
Pull boxes 5D
Pull-in guides, cables & wire....12B
Pullers, cable 12B
Pullers, fish tape....12B
Pullers, fuse 12L
Pulleys, cable-pulling 12B
Pulling compound, wire....12V
Pulling elbows 7E
Pulling-in irons 1C
Pump cable 6D
Pump controls 3J
Pump motors 8D
Pumps, bending & pushing 12C
Pumps, heat 11B
Pumps, manhole 1C
Punches, knockout 12C
Purifiers, air 11F
Pushbutton stations 3M
Pushbutton switches 5A
Pushers, pipe 12C

Q

Quartz, fused 12U
Quartz-lamp holders 5C
Quartz lamps 9G

R

Raceway ....7A to 7L
Raceway & fixtures supports, combined..7H
Raceway tools 12C
Racks, cable 1C, 6G
Racks, conduit 12C
Radiators, steam electric....11A
Radiators, transformer 2A
Radio systems, 2-way 10F
Radioisotope-excited light sources....7H
Rails, conductor 6J
Rails, manhole guard....1C
Railway cable 6D
Railway motors 8D
Range cords 6E
Range hoods 11F
Range receptacles 5B
Reactors, saturable 3K
Reamers, conduit 12C
Receptacles 5B
Rechargeable dry cells....2E
Recording-type meters 10A
Rectifiers 2C
Rectifying transformers 2B
Reducers, fuse clip....4C
Reducers, lamp socket....5C
Reel lifts, wire....12G
Reel-type trouble lamps....9E
Reels, cable 12B
Reels, fish tape....12B
Reflector-flood lamps 9G
Reflectors, lighting fixture....9H
Registers, in-and-out 10F
Regulators, motor speed....3M
Regulators, voltage 3P
Relay testers 10C
Relays 3N
Remote control cord sets 6E
Remote control switches....3H
Removers, fuse adapter 4C
Removers, wedge 12G
Residential lighting 9A
Resistance testers 10C
Resistors, dc fluorescent circuit....5C
Resistors, load 3P
Respirators 12W
Resurfacers, commutator 12E
Retracting cords 6E
Revolution counters 10B
Rheostats 3P
Rigid conduit 7D
Rings, collecting 6F
Rings, commutator 12P
Rings, drive & bridle....6G
Rings, gimbal 9H
Rings, slip 12P
Rippers & strippers, wire....12B
Rocker-type switches 5A
Rods, armour 1D
Rods, ground 4E
Rods, insulation 12Q
Rolling stock, pole line....1B
Rotary converters 2D
Rotary relays 3N
Rotary switches 5A
Rubber tape 12R
Rubber tubing 12T
Running-thread, conduit 7E
Rust-preventatives 12V

S

Safety switches 3G
Saturable reactors 3K
Saws, commutator 12E
Saws, hole 12M
Saws, portable electric 12M
Scaffolding 12D
Scissors, electrician's 12L
Scrapers, slot 12E
Screw-anchoring compounds 12K
Screw-on wire connectors 6F
Screw sockets 5C
Screws, jack 12D
Screwdrivers, electrician's 12L
Sealed beam lamps....9G
Sealing compound, bolt....12K
Sealing compound, cable 12V
Sealing compound, conduit....7E
Sealing devices 12K
Seals, cable end....6F
Seals, conduit 7E
Seals, equipment 12K
Seals, meter 12V
Searchlights 9D
Seaters, brush 12E
Secondary batteries 2E
Selenium rectifiers 2C
Self-coiling cords 6E
Series street lighting cable 6D
Series street-lighting lamps....9G
Service entrance & drop cable....6D
Service entrance hardware....7E
Service entrance panels....3D
Service entrance switches....3G
Service, estimating & pricing....12X
Service station lighting....9D
Servo components 3K
Setters, pole 1B
Sets, balancing 8F
Sets, generating 8F
Sets, M-G 8F
Sewing machine motors....8D
Shafts, flexible 12P
Shears, metal 12M
Sheet insulation 12Q
Shelving, parts storage....12D
Shields, cable 1C
Shields, expansion 12K
Shields, face protective 12W
Shields, manhole 1C
Shifters, phase 2D
Shims, motor & generator 12P
Shock-isolating mounts 12N
Shock-resistant lamps 9G
Shoes, collecting 6F
Showcase lighting 9C
Sidewalk boxes 5D
Sign cable, gas tube....6D
Sign lighting 9D
Signal & communication cable....6D
Signal equipment 10F
Signaling transformers 2B
Signs, lighted display 9C
Silent-type switches 5A
Silicon rectifiers 2C
Silicone insulation 12Q
Silicone sleeving 12T
Silicone tape 12S
Silk insulation 12Q
Single-phase motors 8B
Single-phasing protection 4E
Sirens 10G
Slate, electrical 12U
Sleeving, flexible 12T
Slip rings, motor & generator 12P
Slot scrapers & files....12E
Slot wedges & sticks 12V
Smoke alarms 10B
Snap switches 3H
Snow-melting cable 11C
Soapstone conduit 7D
Socket accessories 5C
Sockets, lamp 5C
Sockets, lamp starter....5C
Sockets, meter 5H
Sodium-vapor fixtures 9C
Sodium-vapor lamps 9F
Soil-heating cable 11C
Solder 12V
Soldering equipment 12H
Soldering flux & paste 12V
Soldering transformers 2B
Solderless connectors 6F
Solenoid coils 12V
Solenoid-operated brakes 3K
Solenoid valves 3K
Solenoids 3K
Sound-level indicators 10B
Sound-powered telephones 10F
Sound systems 10F
Sounding devices 10G
Space heaters, electric....11A
Spacers, cable 6G
Speed regulators & controls....3M
Splash-proof motors 8C
Splices & kits....6F
Splicing compound 12V
Splicing tools 12B
Spotlights 9D
Sprayers 12J
Spreaders, coil 12D
Sprinkler alarms 10B
Stage lighting 9C
Stage lighting cable....6D
Stage switchboards 3C
Stair tread lights 9A
Standards, lighting 9D
Stands, armature 12E
Stands, pipe vise....12C
Stands, soldering 12H
Stands, wire & cable....12B
Staplers, wire 12B
Staples, cable 6G
Star drills 12M
Starter sockets 5C
Starters, fluorescent lamp....5C
Starters, motor 3M
Static balancers 12E
Static controls 3K
Static converters 2D
Static neutralizers & eliminators....12N
Stations, pushbutton 3M
Stator fields 12E
Steam boilers (electric)....11C
Steam-powered generators 8F
Steam radiators, electric....11A
Stepping motors 8D
Steps, manhole 1C
Sticks, disconnect 12A
Sticks, slot 12P
Stocks, conduit threading....12C
Stones, commutator 12E
Storage batteries 2E
Storage equipment 12E
Strain-relief bushings 6G
Strand benders 12B
Straps, cable 6G
Straps, conduit 7E
Street lighting 9D
Street lighting cables 6D
Street lighting controls....3J
Street-lighting lamps 9G
Stringing equipment, wire....12A
Strip heaters 11C
Strip, renewable fuse....4C
Strippers, wire 12B
Stripping compound, wire 12V
Stroboscopes 10C
Structure, cable-supporting 6G
Studs, lighting fixture box....5E
Submarine cable 6D
Submersible boxes 5D

Submersible motors 8C
Subminiature controls and switches 3H
Substations, unit 3A
Suburban cable 6D
Supports, box 5E
Supports, busbar 6H
Supports, catenary 1D
Supports, conductor 6G
Supports, conduit 7E
Supports, lighting fixture 5G, 9H
Supports, lighting fixture & raceway combined 7H
Surface raceway 7H
Swimming pool heaters 11C
Switch boxes 5D
Switch cabinets 5F
Switch-operating mechanisms 3J
Switchboard mats 12U
Switchboards 3C
Switches, disconnect 3M
Switches, drum 3M
Switches, explosion-proof 3G
Switches, field discharge 3K
Switches, power 3G
Switches, primary 3F
Switches, wiring device 5A
Switchgear 3B
Switching systems, low-voltage 3L
Switchplates 5E
Synchronous converters 2D
Synchronous motors 8B
Synchroscopes 10B
System analyzers 10C

T

T-bars, lighting fixture 9H
Table lamps 9A
Tachometers 10A
Tags, wire & cable 12V
Takeoffs, power 12C
Tampers, coil 12D
Tamping bars 12A
Tanks, melting 12J
Tanks, transformer 2A
Tap-changing equipment 2A
Tap-changing transformers 2B
Tap switches 5A
Tape 12R, 12S
Tape, fish 12B
Tape, heating 11C
Tapers, coil 12F
Taps, cord-connecting 5B
Taps, fused 5B
Telephone systems 10F
Television/ac combination outlets 5B
Television antenna outlets 5B
Television, industrial & commercial 10F
Temperature controls 3J
Temperature indicators 10B
Temporary power connectors 6F
Tents, manhole 1C
Terminal blocks 6F
Terminal boxes, motor & generator 12P
Terminals, wire & cable 6F
Terminators, cable 6F
Test leads & clips 12L
Testing instruments 10C
Thawing transformers 2B
Theater switchboards 3C
Thermal lamp starters 5C
Thermal overload devices 4E
Thermal protectors, ballast 4E
Thermistors 3P
Thermostat wire & cable 6D
Thermostats 3J
Thinwall conduit 7G
Thread guards, conduit 7E
Thread lubricant 12V
Threaded inserts 12K
Threaders, conduit 12C
Through-cord switches 5A
Ties, cable 6G
Time switches & timers 3H
Timing motors 8D
Timing & time delay relays 3N
Toggle bolts 12K
Toggle switches 5A
Tongs, pole 12A
Tool bags & holders 12L
Tool chests 12D
Tool motors 8D
Tool pickups & grapples 12C
Tool pouches, buckets & bags 12A, 12L
Tools, armature & stator repair 12E
Tools, cable & wire 12B
Tools, coil 12F
Tools, hand 12L
Tools, insulation 12G
Tools, linemen's 12A
Tools, portable electric 12M
Tools, fastening 12K
Tools, raceway 12C
Tools, shop—miscellaneous 12J
Tools, soldering 12H
Torches, soldering 12H
Torque wrenches 12L
Totally enclosed motors 8C
Towers, conductor-supporting 1A
Towers, floodlighting 9D
Towers, mobile construction 1B
Towers, work 12D
Traffic signal lamps 9G
Traffic signals 9D
Trailer cable 6D
Trailer park panels 3D
Trailers, office & workshop 12D
Trailers, pole 1B
Transfer, switches 3G
Transformer bushings 2A
Transformer cabinets 5F
Transformer gins 12A
Transformer mounting brackets 2A
Transformer radiators 2A
Transformer tap-changing equipment 2A
Transformers 2A, 2B
Trays, cable-supporting 6G
Tree trimmers & pruners 12A
Trench braces 1C
Trenchers 1B
Trenching tools, hand 12A
Trimmers, tree 12A
Trolley duct 7B
Trolley wire 6D
Trolley wire protective enclosures 5F
Trouble lamps 9E
Troughs, cable-supporting 6G
Troughs & mountings, meter 5H
Truck bodies 1B, 12D
Trucks, construction 1B
Trucks, hand 12D
Trucks, lift 12D
Trucks, maintenance 12D
Tube-to-cable connectors 6F
Tubes, fluorescent 9F
Tubes, lighting (standards) 9D
Tubing, electric metallic 7F
Tubing, flexible 12T
Tubing, insulation 12Q
Tumbler switches 5A
Turbine-powered generators 8F
Turners, paper 12G
Turns-ratio, testers 10C
Turntables, cable 12A
Turntables, display 12N
Twine, banding & lacing 12M
Twisters, wire 12B
Two-way radio systems 10F

U

Ultra-violet lamps 9G
Undercutters, armature 12E
Underfloor duct 7K
Underground boxes 5D
Underwater lighting 9D
Unions, explosion-proof 5E
Unit heaters, electric 11A
Unit substations 3A

V

Vacuum cleaners 12J
Vacuum switches 3H
Valves, electrically operated 3K
Vaporproof circuit breakers 4D
Vaporproof lighting fixtures 9C
Variable-speed drives 8J
Variable voltage transformers 2B
Varistors 3P
Varmeters 10A
Varnish 12U
Varnished cambric tape 12H
Varnished canvas 12U
Varnished insulation 12Q
Ventilating equipment 11F
Ventilators, manhole 1C
Vibration-isolating mounts 12N
Vibration meters 10A
Vises, pipe 12C
Volt-ammeters 10A
Voltage-regulating transformers 2B
Voltage regulators 3P
Voltage testers 10C
Voltmeters 10A
Vulcanizing equipment 12B

W

Wall air conditioners 11E
Wall anchors 12K
Wall plates 5E
Warning lights 9C
Water-cooled leads 6D
Wattmeters 10A
Weatherproof boxes ..... 5B, D
Weatherproof cabinets 5F
Weatherproof covers & plates 5E
Weatherproof lighting 9A, 9D
Weatherproof motors 8C
Weatherproof outlets 5B
Weatherproof sockets 5C
Weatherproof switches 5A
Wedge drivers & removers 12G
Wedges, slot 12M
Welders 12J
Welding cable 6D
Welding controls 3J
Welding flux 12M
Welding transformers 2B
Welding-type cable connectors 6F
Whistles 10G
Winches 12D
Winches, cable-pulling 12B
Winders, coil 12F
Windings, motor & generator 12P
Window air conditioners 11E
Wire, cable & cords ..... 6A, B, C, D, E
Wire & cable compounds 12M
Wire & cable reels 12B
Wire & cable supports 6G
Wire & cable tools 12B
Wire, fish 12B
Wire-installation guns 12B
Wire preheaters 11C
Wire-stringing equipment 12A
Wire & strip, fuse 4C
Wire strippers 12B
Wire-stripping compound 12M
Wire tags & markers 12M
Wireholders, pole line 1D
Wireways 7L
Wiring device boxes 5D
Wiring device switches 5A
Wiring devices ..... 5A to 5G
Wood preservative 12V
Work towers 12D
Woven tape 12S
Wrapping, cable 12U
Wrenches, torque & impact 12L
Wrought-iron conduit 7D

X-Y-Z

Yard lights 9D

SECTION 1. OUTDOOR DISTRIBUTION EQUIPMENT

See index for transmission line utilization equipment such as switches, transformers and cut-outs.

1A. CONDUCTOR SUPPORTING STRUCTURES

1. **Crossarms**
2. **Poles**
3. **Towers**

Basic equipment used to support outdoor power transmission line conductors.

American Creosote Works Inc 1305 Dublin St (Box 4008) New Orleans 18 La (1-2)
American Crossarm and Conduit Co 7726 Sheridan Rd Chicago 26 Ill (1)
Bell Lumber & Pole Co 524 Midland Bank Bldg Minneapolis 1 Minn (2)
Brooks Lumber Co P O Box 153 Bellingham Wash (1)
Brown Wood Preserving Co 409 Commonwealth Bldg Louisville 2 Ky (2)
Carney (B J) & Co 326 Peyton Bldg Spokane 8 Wash (2)
Graybar Electric Co Inc 420 Lexington Ave NY 17 NY (2)
Haley (R G) & Co Inc 767 Spitzer Bldg Toledo 4 Ohio (1-2)
Hatheway & Patterson Co Inc 15 County St Mansfield Mass (1)
Hubbard & Co 6301 Butler St Pittsburgh 1 Pa (1)
Hughes Bros Inc Seward Neb (1-3)
Husky Products Inc 5300 Vine St Cincinnati 17 Ohio (3)
International Paper Co Wood Preserving Div Kansas City 6 Mo (2)
Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 Ill (1-2)
Koppers Co Inc Wood Preserving Div 750 Koppers Bldg Pittsburgh 19 Pa (2)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (1)
McFarland (L D) Co McFarland Bldg Sandpoint Idaho (2)
National Pole & Treating Div Minnesota & Ontario Paper Co 500 Investors Bldg Minneapolis 2 Minn (2)
Poles Inc E 706 Sprague Ave Spokane 3 Wash (1-2)
Republic Creosoting Co 1615 Merchants Bank Bldg Indianapolis 4 Ind (1-2)
Texas Creosoting Co P O Box 131 Orange Tex (1-2)
Union Metal Mfg Co 1432 Maple Ave Canton 5 Ohio (3)

1B. LINE TRUCKS & MOBILE EQUIPMENT

1. **Earth-boring trucks & machines**
2. **Mobile towers & lifts**
3. **Pole-setting trucks & bodies**
4. **Trailers & dinkies**
5. **Trenchers & ditchers**

Apparatus used to transport, erect and maintain power transmission line equipment.

Adams Engineering Co 31711 Solon Rd Solon Ohio (1-4)
Barber-Greene Co 400 N Highland Ave Aurora Ill (5)
Case (J I) Co Racine Wis (5)
Charles Machine Works Inc P O Box 66 Perry Okla (5)
Cleveland Trencher Co 20100 St Clair Ave Cleveland 17 Ohio (5)
Davis Mfg Co Inc 1500 S McLean Blvd Wichita Kans (4-5)
Emhart Mfg Co Skyworker Div 760 Windsor St Hartford 1 Wis (2)
F W D Corp 105 E 12 St Clintonville Wisc (1-3)
Highway Trailer Co 405 E Fulton St Edgerton Wis (1-4)
Holan Corp 4100 W 150 St Cleveland 35 Ohio (1-2-3-4)
McCabe-Powers Body Co 5900 N Broadway St Louis 15 Mo (1-2-3-4)
Mercury Hydraulics Inc 1632 Wazee St Denver 2 Colo (5)
Mobile Aerial Towers Inc 1730 N Harrison St Fort Wayne Ind (2)
Morrison Steel Products Inc 601 Amherst St Buffalo 7 NY (1-2-3)
Pitman Mfg Co Garner Ave & Duck Rd Grandview Mo (2)
Safety Live Line Tool Co 973 86th Ave Oakland 21 Calif (4)
Salem Tool Co 767 S Ellsworth Ave Salem Ohio (1)
Silent Hoist & Crane Co 841 63rd St Brooklyn 20 NY (2-3)
Stahl Metal Products Inc 3490 W 140 St Cleveland 11 Ohio (4)
Stampings Inc Suite 314 321 24th St Rock Island Ill (5)
Utility Body Co 1530 Wood St Oakland 7 Calif (2-3)
Williams (Hugh B) Mfg Co 8330 Lovett St (P O Box 7815) Dallas Tex (1-3)

1C. MANHOLE & TRENCH EQUIPMENT

1. **Cable duct shields**
2. **Cable racks, hangers, arms, hooks & extensions**
3. **Clay duct dowel pins**
4. **Guard rail, shields & tents**
5. **Manhole cover hooks**
6. **Manhole frames & covers**
7. **Manhole ladders**
8. **Manhole steps**
9. **Pulling-in irons**
10. **Pumps**
11. **Ventilators**
12. **Trench braces**

Basic underground equipment used in providing access to cable runs.

Alhambra Foundry Co Ltd 1147 Meridian Ave Alhambra Calif (6-7-8)
Aurora Pump Div New York Air Brake Co 54 Loucks St Aurora Ill (10)
Barry (William B) Co 117 Causeway St Boston 14 Mass (1)
Chain Belt Co 4701 W Greenfield Ave Milwaukee 1 Wis (10)
Chance (A B) Co 210 North Allen St Centralia Mo (1-2-3-7-9)
Cope (T J) Div Rome Cable Corp Third & Walnut Sts Collegeville 5 Pa (1-2-4-5-6-8-9)
Coppus Engineering Corp 344 Park Ave Worcester 10 Mass (11)
Hubbard & Co 6301 Butler St Pittsburgh 1 Pa (1-2-3-7-8-9)
Husky Products Inc 5300 Vine St Cincinnati 17 Ohio (2)
Hypro Engineering Inc 700 39th Ave N E Minneapolis 21 Minn (10)
Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 Ill (2-9)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (2-9)
Oliver Electrical Mfg Co P O Box 217 Battle Creek Mich (1-2-3-7-8-9)
Piqua Machine & Mfg Co 441 S College St Piqua Ohio (10)
St Louis Malleable Casting Co 7701 N Conduit Ave St Louis 15 Mo (2)
Steel City Electric Co 1207 Columbus Ave Pittsburgh 33 Pa (2)
Swett (A L) Iron Works 166 Glenwood Ave Medina NY (6-8-12)
United Electric Motor Co 178 Centre St NY 13 NY (11)
Utilities Service Co 1 Pine St Allentown Pa (2-7-8)

1D. POLE & TOWER EQUIPMENT

1. **Anchoring & guying materials**
2. **Dating nails & markers**
3. **Grounding equipment**
4. **Insulators & wireholders**
5. **Pole, crossarm & line hardware**
6. **Platforms & accessories**

Pole & crossarm hardware includes such materials as dead ends, armor rods, line splices, brackets, special bolts and pins, catenary supports, etc.

Acromark Co 320 Morrell St Elizabeth 4 NJ (2)
Blackburn (Jasper) Corp 1525 Woodson Rd St Louis 14 Mo (3)
Brewer-Titchener Corp 111 Port Watson St Cortland NY (5)
Chance (A B) Co 210 N Allen St Centralia Mo (4-5)
Chase Brass & Copper Co Inc 236 Grand St Waterbury 20 Conn (2)
Copperweld Steel Co Wire and Cable Div Glassport Pa (1, 2, 3)
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill (1-4)
Dixie Electrical Mfg Co P O Box 745 Birmingham Ala (1-3-4-5)
Electroline Mfg Co 2622 E 51st St Cleveland 4 Ohio (4)
Fanner Mfg Co Electric Products Div Brookside Park Cleveland 9 Ohio (5)
Fargo Mfg Co Inc 845 Main St Poughkeepsie NY (5)
Fletcher Mfg Co 302 E 2nd St Dayton 2 Ohio (5)
Graybar Electric Co Inc 420 Lexington Ave NY 17 NY (1-2-3-4-5)
Grip-Tite Mfg Co 115 W Jefferson St Winterset Iowa (1)
Haley (R G) & Co Inc 767 Spitzer Bldg Toledo 4 Ohio (5)
Hubbard & Co 6301 Butler St Pittsburgh 1 Pa (1-2-3-4-5)
Hughes Bros Inc Seward Neb (1-3-5-6)
Hussey (C G) & Co 2850 Second Ave Pittsburgh 19 Pa (2)
I-T-E Circuit Breaker Co Victor Insulators Div Victor NY (4)
Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 Ill (1 thru 5)
Kearney (James R) Corp 4236 Clayton Ave St Louis 10 Mo (1)
Kimble Glass Co P O Box 1035 Toledo 1 Ohio (4)
Knox Porcelain Corp 2706 Mynders Ave P O Box 2031 Knoxville 1 Tenn (4)
Lapp Insulator Co Inc 35 Gilbert St Leroy NY (4)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (1-3-4-5)
Lint (Clyde W) 2323 W 18 St Chicago 8 Ill (4)
Ohio Brass Co 380 N Main St Mansfield Ohio (4)
Oliver Electrical Mfg Co P O Box 217 Battle Creek Mich (1-2-3-4-5)
Page Steel & Wire Div American Chain & Cable Co Inc P O Box 692 Monessen Pa (1)
Penn-Union Electric Corp 315 State St Erie Pa (1)
Pieper-Lillard Div Jasper Blackburn Corp 1525 Woodson Rd St Louis 14 Mo (1)
Porcelain Products Co 224 N Patterson St Carey Ohio (3-4-5)
Preformed Line Products Co 5349 St Clair Ave Cleveland 3 Ohio (1-5)
Premax Products Div Chisholm-Ryder Co College & Highland Aves Niagara Falls NY (2-3)
Safety Live Line Tool Co 973 86th Ave Oakland 21 Calif (3-6)
St Louis Malleable Casting Co 7701 N Conduit Ave St Louis 15 Mo (4-5)
South River Metal Products Co Inc 377 Turnpike South River NJ (1)
Superior Porcelain Co 931½ Market St Parkersburg W Va (4)
Thiel Tool & Engineering Co 1417 N Market St St Louis 6 Mo (5)
Universal Clay Products Co 1558 First St Sandusky Ohio (4)
Utilities Service Co 1 Pine St Allentown Pa (1-2-3-4-5)
Weaver (J A) Co 2110 Howard St St Louis 6 Mo (3)
Wrought Washer Mfg Co 2280 S Bay St Milwaukee 7 Wis (5)

SECTION 2. TRANSFORMERS AND CONVERSION EQUIPMENT

2A. POWER & LIGHTING TRANSFORMERS, AUTOTRANSFORMERS & ACCESSORIES

1. **Dry-type transformers**
2. **Liquid-filled transformers**
3. **Transformer radiators & tanks**
5. **Tap-changing equipment**
6. **Transformer mounting brackets**

General-purpose transformers for substations, building light and power, and transmission line distribution.

A C Transformer Corp 89 Madison St Newark NJ (1)
Acme Electric Corp 45 Water St Cuba NY (1)
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (1-2)
American Rectifier Corp 95 Lafayette St NY 13 NY (1)
Atlantic Transformer Co 8330 Hegerman St Philadelphia 36 Pa (1)
Atlantic Transformer Div New London Instrument Co Inc 30 Hynes Ave Groton Conn (1-2)
Barkelew Electric Mfg Co 1905 Columbia Ave Middletown Ohio (5)
Central Transformer Corp P O Box 687 Pine Bluff Ark (1-2)
Crittenden Transformer Works Inc 13011 S Spring St Los Angeles 61 Calif (1)
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill (2)
Delta-Star Electric Div Hill Transformer Works H K Porter Co Inc 1030 Washington St San Carlos Calif (1-2)
Djeco Div Djordevic Engineering Co 1933 N Damen Ave Chicago 47 Ill (1-2)
Dongan Electric Mfg Co 2987-3001 Franklin St Detroit 7 Mich (1)
Eisler Engineering Co Inc 750 S 13 St Newark 3 NJ (1-2)
Electro Engineering Works 401 Preda St San Leandro Calif (1)
Erie Electric Co Inc 120 Church St Buffalo 2 NY (1-2)
Emsco Mfg Co P O Box 1039 Greenville Tex (1-2)
Federal Pacific Electric Co 50 Paris St Newark 5 NJ (1-2)
General Electric Co Apparatus Sales Div Schenectady 5 NY (1-2-5)
●**GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (1-2)—ADV PG 2**
Hindle Transformers Co Inc Woods Church Rd Flemington NJ (1)
Hughes Bros Inc Seward Neb (6)
I-T-E Circuit Breaker Co 1900 Hamilton St Philadelphia 30 Pa (1-2)
Jefferson Electric Co 25th & Madison Bellwood Ill (1)
Jeffries Transformer Co 610 Turner St Los Angeles 12 Calif (1)
Kolton Electric Mfg Co 123 New Jersey Railroad Ave Newark 5 NJ (1-2)
Kuhlman Electric Co P O Box 288 Birmingham Mich (1-2)
Land-Air Inc 7444 W Wilson Ave Chicago 31 Ill (1)
Lindberg Engineering Co 2450 W Hubbard St Chicago 12 Ill (1)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (1-2-5)
Magnatran Inc P O Box 211 Kearny NJ (1-2)
●**MARCUS TRANSFORMER CO INC Leesville Ave Rahway NJ (1-2)—ADV PG 126**
Moloney Electric Co 5390 Bircher Blvd St Louis 20 Mo (1-2-5)
●**NIAGARA TRANSFORMER CORP 1751 Dale Rd Buffalo 25 NY (1-2)—ADV PG 140**
Nothelfer Windings Labs Inc 5 Albemarle Ave (P O Box 455) Trenton 3 NJ (1)
Pennsylvania Transformer Div McGraw-Edison Co Box 330 Canonsburg Pa (1-2)
●**PRECISION TRANSFORMER CORP 2218 West Lake St Chicago 12 Ill (1-2)—ADV PG 113**
R T & E Corp 1900 East North St Waukesha Wis (2)
Raytheon Mfg Co Commercial Apparatus & Systems Div 100 River St Waltham 54 Mass (1)
Shaw-Perkins Mfg Co 201 E Carson St Pittsburgh 19 Pa (3)
●**SORGEL ELECTRIC CO 8388 W National Ave Milwaukee 4 Wis (1)—ADV PG 128**
Standard Transformer Co 140 Dana St N E Warren Ohio (1-2)
Thiel Tool & Engineering Co 1417 N Market St St Louis 6 Mo (6)
Uptegraff Mfg Co R E P O Box 182 Scottsdale Pa (1-2)
●**UTILITY TRANSFORMER AND EQUIPMENT CO 702 Lynn Ave Baraboo Wis (1)—ADV PG 143**
●**WAGNER ELECTRIC CORP 6400 Plymouth Ave St Louis 33 Mo (1)—ADV PG 42-141**
●**WESTINGHOUSE ELECTRIC CORP P O Box 868 Pittsburgh 30 Pa (1-2-5) ADV PG 4-69-70-71-72**
●**WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1-2) —ADV PG 2nd COVER**
●**WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1-2) ADV PG 2nd COVER**

2B. SPECIAL PURPOSE TRANSFORMERS

1. **Arc & discharge lamp**
2. **Control**
3. **Heating**
4. **Ignition**
5. **Instrument**
6. **Phase-changing or -shifting**
7. **Rectifying**

8. Pipe thawing
9. Signalling
10. Tap-changing
11. Variable voltage
12. Voltage-regulating
13. Welding, soldering & brazing
14. Current-limiting
15. Isolating
16. Furnace control
17. Grounding
18. Machine tool

Transformers designed to serve specific or specialized functions or equipment.

A C Transformer Corp 89 Madison St Newark NJ (2-3-6-7-13)
Accurate Engineering Co 2005 Blue Island Ave Chicago 8 Ill (6)
Acme Electric Corp 45 Water St Cuba NY (1-2-5-6-7-9 thru 13-15-18)
Acro Welder Mfg Co 1719 W St Paul Ave Milwaukee 3 Wis (13)
Advance Transformer Co 2950 N Western Ave Chicago 18 Ill (1)
Allis-Chalmers Mfg. Co. 930 S. 70th St Milwaukee 1 Wis (5-7-10-12)
Annis (R B) Co 1101 N Delaware St Indianapolis 2 Ind (5)
Arjac Products Inc 55-59 Halstead St Rochester 10 NY (1)
Associated Research Inc 3789 W Belmont Ave Chicago 18 Ill (5)
Atlantic Transformer Co 8330 Hegerman St Philadelphia 36 Pa
Atlantic Transformer Div New London Instrument Co Inc 30 Hynes Ave Groton Conn (5-9)
Berkshire Transformer Corp Kent Conn (2-3-4-5-7-9-10-13)
Bush Transformer Corp 707 North St Endicott NY (1 thru 7-9-10-12)
Cable Electric Products Inc 234 Daboll St Providence 7 RI (9)
Central Transformers Co 900 W Jackson Blvd Chicago 7 Ill (2-9-13)
Cold Cathode Lighting Corp 76 S Bayles Ave Port Washington NY (1)
Crest Transformer Corp 1834-36 W North Ave Chicago 22 Ill (2-9)
Crittenden Transformer Works Inc 13011 S Spring St Los Angeles 61 Calif (3-5-7)
Cutler-Hammer Inc 228 N 12th St Milwaukee 1 Wis (2)
Davenport Mfg Co 2532 N Elston Ave Chicago 47 Ill (5)
Daystrom Inc Weston Instruments Div 614 Frelinghuysen Ave Newark 12 NJ (5)
Djeco Div Djordjevic Engineering Co 1933 N Damen Ave Chicago 47 Ill (2-5-7-10-12)
Dongan Electric Mfg Co 2987-3001 Franklin St Detroit 7 Mich (1-2-4-9-18)
Dormeyer Industries 3418 Milwaukee Ave Chicago 41 Ill (2-4-7-11)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (14)
Easco Products Inc (P O Box 587) Ypsilanti Mich (11)
Edwards Co Inc Norwalk Conn (9)
Electran Mfg Co 1901 Clybourn Ave Chicago 14 Ill (1-2-5-6-7-9-10-13)
Electrical Windings Inc 2015 N Kolmar Ave Chicago 39 Ill (5-15)
Electro Engineering Works 401 Preda St San Leandro Calif (6)
France Mfg Co 10325 Berea Rd Cleveland 2 Ohio (1-3)
General Electric Co Apparatus Sales Div Schenectady 5 NY (2 thru 7-9 thru 12)
General Radio Co West Concord Mass (11)
Harold Electric Co 210 E Adler St Walla Walla Wash (8)
Hindle Transformer Co Inc Woods Church Rd Flemington NJ (2-3-6-7-9)
Hughely & Phillips Inc 3200 North San Fernando Blvd Burbank Calif (15)
Jefferson Electric Co 25th & Madison Bellwood Ill (1-2-4)
Jeffries Transformer Co 610 Turner St Los Angeles 12 Calif (2-6-17)
Knopp Inc 1307 66th St Oakland 8 Calif (5)
Kolton Electric Mfg Co 123 New Jersey Railroad Ave Newark 5 NJ (2-6)
Lee Electric, Inc 566 52nd St West New York NJ (9)
Liberty Bell Mfg Co Swainsboro Ga (9)
Marcus Transformer Co Inc Leesville Ave Rahway NJ (6-7-13-16)
McCarthy Electric Co 9640 Grinnell Detroit 13 Mich (13)
Midwest Electric Products Inc 1515 N Front St Mankato Minn (5)
Moloney Electric Co 5390 Bircher Blvd St Louis 20 Mo (7-10-12)
Nepo Mfg Co 4230 N Sayre Chicago 34 Ill (1)
Nothelfer Winding Labs Inc 5 Albemarle Ave (P O Box 455) Trenton 3 NJ (3-5-7-13)
Nutone Inc Madison & Red Banks Roads Cincinnati 27 Ohio (9)
Ohmite Mfg Co 3601 Howard St Skokie Ill (11)
Opad Electric Co 43 Walker St New York 13 NY (7)
Partrick & Wilkins Co 51 N Seventh St Phila 6 Pa (9)
Pennsylvania Transformer Div McGraw-Edison Co Box 330 Canonsburg Pa (3-10-13)
●PRECISION TRANSFORMER CORP 2218 West Lake St Chicago 12 Ill (2-3-7-13) ADV PG 113
Raytheon Mfg Co Commercial Apparatus & Systems Div 100 River St Waltham 54 Mass (7-13)
Rittenhouse Co Inc East St Honeoye Falls NY (9)
Russell & Stoll Co Inc 125 Barclay St NY 7 NY (2)
Sangamo Electric Co 11th & Converse Springfield Ill (5)
Simplex Co Inc 1139-41 N MacArthur Blvd Springfield Ill (5)
Sola Electric Co 1719 Busse Rd Elk Grove Ill (1-12)
Sorensen & Co Inc Richards Ave South Norwalk Conn (6-7-12)
●SORGEL ELECTRIC CO 8388 W National Ave Milwaukee 4 Wis (2-3-6 thru 10-13)—ADV PG 128
Southwestern Industrial Electronics Co 10201 Westheimer (P O Box 22187) Houston 27 Tex (5-7-12)
Sperti Faraday Inc 1322 E Church St Adrian Mich (1-5-9)
Standard Electrical Products Co 2240 E Third St Dayton 3 Ohio (11-12)
Standard Transformer Co 140 Dana St N E Warren Ohio (5)
States Co 19 New Park Ave Hartford 6 Conn (6)
Superior Electric Co 83 Laurel St Bristol Conn (5-11)
Superior Electric Co 83 Laurel St Bristol Conn (11)
Taylor-Winfield Corp 1052 Mahoning Ave N W Warren Ohio (3-13)
Touch-Plate Mfg Corp Box 1970 Long Beach Calif (2)
Trine Mfg Corp 1430 Ferris Pl New York 61 NY (9)
United States Electronics Corp 275 Warren St Lyndhurst NJ (2)
United Transformer Co 150 Varick St New York 13 NY (1-2-3-5-7-9-11-12)
Uptegraff (R E) Mfg Co P O Box 182 Scottdale Pa (5)
●UTILITY TRANSFORMER AND EQUIPMENT CO 702 Lynn Ave Baraboo Wis (6-7)—ADV PG 143
Western Electro-Mechanical Co Inc 300 Broadway Oakland 7 Calif (5)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (2-5-6-7-9 thru 18)

2C. RECTIFIERS

1. Copper oxide
2. Electronic tube
3. Germanium
4. Mechanical
5. Selenium
6. Silicon

Apparatus used for industrial applications which require conversion of alternating to direct current.

Accurate Engineering Co 2005 Blue Island Ave Chicago 8 Ill (5)
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (3-6)
American Rectifier Corp 95 Lafayette St NY 13 NY (5-6)
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (5-6)
Bradley Semiconductor Corp 275 Walton St New Haven 11 Conn (1-5-6)
Cathodic Protection Service 4601 Stanford St Houston Tex (5-6)
Conant Laboratories Box 3997 Bethany Station Lincoln 5 Neb (1-5)
Djeco Div Djordjevic Engineering Co 1933 N Damen Ave Chicago 47 Ill (2-3-5-6)
Gates Electronic Co 2090 Barnes Ave Bronx 62 NY (5-6)
General Electric Co Apparatus Sales Div Schenectady 5 NY (5-6)
Good-All Electric Mfg Co 112 W First St Ogalla Neb (5-6)
I-T-E Circuit Breaker Co 1900 Hamilton St Philadelphia 30 Pa (6)
ITT Components Div P O Box 412 Clifton NJ (5-6)
Kneisley Electric Co 2501-2509 Legrange St Toledo 3 Ohio (2-5-6)
Magnatran Inc P O Box 211 Kearny NJ (2)
Mallory (P R) & Co Inc 30 S Gray St Indianapolis 6 Ind (1)
Miller (Sandford) Co 11 Lynch St Brooklyn 11 NY (5-6)
Opad Electric Co 43 Walker St New York 13 NY (5)
Potter & Rayfield Inc P O Box 1042 Atlanta Ga (2)
Pyramid Electric Co 1445 Hudson Blvd North Bergen NJ (5)
Radio Receptor Co Inc 240 Wythe Ave Brooklyn 11 NY (5)
Rapid Electric Co Inc 2881 Middletown Rd Bronx 61 NY (3-5-6)
Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland 17 Ohio (2)
Richardson-Allen Corp 116-15 Fifteenth Ave College Point LI NY (5-6)
Schauer Mfg Corp 4500 Alpine Ave Cincinnati 42 Ohio (1)
Shrader (F W) Co 11623 S Broadway Los Angeles 61 Calif (5-6)
States Co 19 New Park Ave Hartford 6 Conn (3)
Stearns Electric Corp 120 N Broadway Milwaukee 2 Wis (5)
Sylvania Electric Products Inc 1740 Broadway NY 19 NY (3)
Syntron Co 690 Lexington Ave Homer City Pa (5-6)
Ther Electric & Machine Works 17 S Jefferson St Chicago 6 Ill (1-2-5)
Versabar Corp 14 Whyte St Jersey City NJ (6)
Vickers Inc Electric Products Div 1847 Locust St St Louis 3 Mo (5-6)
Walker Div Norma-Hoffmann Bearings Corp Stamford Conn (3-5-6)
Weltronic Co 19500 W Eight Mile Rd Detroit 41 Mich (2)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (2-3-5-6)

2D. CONVERTERS

1. Frequency changers
2. Inverters
3. Phase converters & shifters
4. Static converters
5. Synchronous (rotary) converters

Static and rotary converters are used to transform ac current to dc; inverters (static or rotary) are converters which transform dc to ac. Frequency changers convert normal 60-cycle current to a higher frequency; phase converters provide 2- or 3-phase power from a single phase source, or vice versa.

Acme Electric Corp 45 Water St Cuba NY (3-4)
Air-Hydraulics of Indiana 7769 Lafayette Rd New Augusta Ind (3)
Allis (Louis) Co 427 East Stewart St Milwaukee 1 Wis (1)
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (1-4-5)
American Electronics Inc 655 West Washington Blvd Los Angeles 15 Calif (1)
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (1-2-5)
Carter Motor Co 2711 W George St Chicago 18 Ill (1-2-5)
Continental Electric Co 1234 S Prairie Ave (P O Box 895) Hawthorne Calif (1)
Continental Electric Co Inc 325 Ferry St Newark 5 NJ (1)
Cornell-Dubilier Electric Corp 333 Hamilton Blvd South Plainfield NJ (2)
D & R Ltd 402 E Gutierrez St P O Box 1500 Santa Barbara Calif (1)
Dalmotor Co 1375 Clay St Santa Clara Calif (1)
Djeco Div Djordjevic Engineering Co 1933 N Damen Ave Chicago 47 Ill (2-4)
Eicor Div F L Jacobs Co 4235 W North Ave Chicago 39 Ill
Electric Machinery Mfg Co 800 Central Ave Minneapolis 13 Minn (1)
Electric Motors & Specialties Inc King & Hamsher Sts Garrett Ind (1)
Electric Specialty Co 211 South St Stamford Conn (1)
Elliott Co Jeannette Pa (1)
Fairbanks Morse & Co 600 S Michigan Ave Chicago 5 Ill (1)
General Electric Co Apparatus Sales Div Schenectady 5 NY (1 thru 5)
Georator Corp Manassas Va (1)
Hertner Electric Co 12690 Elmwood Ave Cleveland 11 Ohio (1-2-5)
Ideal Electric & Mfg Co East First St Mansfield Ohio (1-2-3-5)
Jerrold Electronics Corp 23rd & Chestnut Sts Phila 3 Pa (1)
Kato Engineering Co 1442 First Ave Mankato Minn (1-2-3-5)
Katolight Corp First Ave at Chestnut (P O Box 891) Mankato Minn (5)
Knopp Inc 1307 66th St Oakland 8 Calif (3)
Kurz & Root Sales & Engineering Corp 232 East North Island St Appleton Wis (1)
Minneapolis-Honeywell Regulator Co Boston Div 40 Life St Boston 35 Mass (4)
Robbins & Myers Inc 1345 Lagonda Ave Springfield Ohio (1)
Sangamo Electric Co 11th & Converse Springfield Ill (5)
Sorensen & Co Inc Richards Ave South Norwalk Conn (1-2-4)
States Co 19 New Park Ave Hartford 6 Conn (3)
Syntron Co 690 Lexington Ave Homer City Pa (4)
System Analyzer Corp 700 W State St Nokomis Ill (3)
Terado Co 1068 Raymond Ave St Paul 14 Minn (2)
Tocco Div Ohio Crankshaft Co 3800 Harvard Ave Cleveland 5 Ohio (1)
Wakefield Co 731 S Water St Vermilion Ohio (1)
Weltronic Co 19500 W Eight Mile Rd Detroit 41 Mich (1)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1 thru 5)

2E. BATTERIES

1. Primary, dry
2. Primary, wet
3. Secondary (storage)
4. Rechargeable dry cells

Primary dry cells are replaced when exhausted; primary wet cells may be restored by replacing electrolyte and electrodes when necessary. Secondary or storage batteries are recharged using a primary source of electrical energy.

Bowers Battery & Spark Plug Co Box 1262 Reading Pa (3)
Bright Star Industries 600 Getty Ave Clifton NJ (1)
Burgess Battery Co Freeport Ill (1)
C & D Batteries Div Electric Autolite Co Washington & Cherry Sts Conshohocken Pa (3)
Carbone Corp 400 Myrtle Ave Boonton NJ (1-2)
Dual-Lite Co Inc Newtown Conn (3)
DuBois Electric Storage Battery Co 500 W DuBois Ave DuBois Pa (3)
Edison (Thomas A) Industries McGraw-Edison Co Storage Battery Div West Orange NJ (3)
Electric Storage Battery Co Wisco Div 1222 18th St Racine Wisc (3)
Exide Industrial Div Electric Storage Battery Co Rising Sun & Adams Ave (P O Box 5723) Philadelphia 20 Pa (3)
Gould-National Batteries, Inc., Trenton 7 NJ (3)
Gulton Industries Inc Alkaline Battery Div Metuchen NJ (3)
Mallory (P R) & Co Inc 30 S Gray St Indianapolis 6 Ind (1)
Marathon Battery Co P O Box 298 Wausau Wis (1)
National Carbon Co 30 E 42 St New York 17 NY (1-2)
Nicad Div Gould-National Batteries Inc Easthampton Mass (3)
Scranton Cellomatic Battery Corp Archbald Pa (3)
Scranton Storage Battery Corp Archbald Pa (3)
Sonotone Corp Elmsford NY (3-4)
Standard Electric Co Inc P O Box 6356 San Antonio 9 Tex (3)
Surrette Storage Battery Co Inc Jefferson Ave Salem Mass (3)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa
Willard Storage Battery Div Electric Storage Battery Co 246-286 E 131 St Cleveland 8 Ohio (3)
Yardney Electric Corp 40-50 Leonard St New York 13 NY (2-3)

2F. BATTERY CHARGERS

Equipment, complete with necessary controls, for restoring secondary batteries. May incorporate metallic-oxide rectifiers, electronic tube rectifiers, or motor-generator set.

Accurate Engineering Co 2005 Blue Island Ave Chicago 8 Ill
Acme Electric Corp 45 Water St Cuba NY
Allis (Louis) Co 427 East Stewart St Milwaukee 1 Wis
American Rectifier Corp 95 Lafayette St NY 13 NY
Automatic Switch Co 50-56 Hanover Rd Florham Pk NJ
Blitz Electric Co 5713 Wentworth Ave Chicago 21 Ill
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ
Bowers Battery Spark Plug Co Box 1262 Reading Pa
Cornell-Dubilier Electric Corp 333 Hamilton Blvd South Plainfield NJ
Curtis Development & Mfg Co 3244 N 33 St Milwaukee 16 Wis
Djeco Div Djordjevic Engineering Co 1933 N Damen Ave Chicago 47 Ill
Edison (Thomas A) Industries McGraw-Edison Co Storage Battery Div West Orange NJ
Electric Power Plants Corp Buffalo St Cadiz Ohio
Electric Products Co 7125 Clarkstone Rd Cleveland 12 Ohio
Electric Service Systems Inc 1330 Quincy St N E Minneapolis 13 Minn
Fairbanks Morse & Co 600 S Michigan Ave Chicago 5 Ill
Fox Products Co 4720 N 18 St Phila 41 Pa
Gates Electronic Co 2090 Barnes Ave Bronx 62 NY
General Electric Co Apparatus Sales Div Schenectady 5 NY
Gould-National Batteries Inc Trenton 7 NJ
Hertner Electric Co 12690 Elmwood Ave Cleveland 11 Ohio
Hobart Bros Hobart Square Troy 1 Ohio
Howard Industries Inc 1760 State St Racine Wis
International Electric Fence Co Inc Box 650 Albert Lea Minn
Jeta Inc Yonkers NY
Jordan Electric Products Div Electric Storage Battery Co 222-228 N 2nd St Minneapolis 1 Minn
Kato Engineering Co 1442 First Ave Mankato Minn
Katolight Corp First Ave at Chestnut (P O Box 891) Mankato Minn
Kohler Co Kohler Wis
Kurz & Root Sales & Engineering Corp 232 East North Island St Appleton Wis
Lincoln Electric Co 22801 St Clair Ave Cleveland 17 Ohio
Mallory (P R) & Co Inc 30 S Gray St Indianapolis 6 Ind
Motoresearch Co 1600 Junction Ave Racine Wis
Onan (D W) & Sons Inc 2515 University Ave S E Minneapolis 14 Minn (2f)
Pioneer Gen- E- Motor Co 5841 W Dickens St Chicago 39 Ill
Quick Charge Div Line Scale Co Inc 3737 N W 37th Oklahoma City Okla
Rex Metal Craft Inc 1717 Gent St Indianapolis 2 Ind
Richardson-Allen Corp 116-15 Fifteenth Ave College Point LI NY
Schauer Mfg Corp 4500 Alpine Ave Cincinnati 42 Ohio
Simplex Co Inc 1139-41 N MacArthur Blvd Springfield Ill
Sonotone Corp Elmsford NY (3-4)
Sorensen & Co Inc Richards Ave South Norwalk Conn
Syntron Co 690 Lexington Ave Homer City Pa
Terado Co 1068 Raymond Ave St Paul 14 Minn
Triple-A Specialty Co 2835 N Western Ave Chicago 18 Ill (2f)
Universal Motor Co 438 Universal Dr Oshkosh Wis
Walker Div Norma-Hoffmann Bearings Corp Stamford Conn
Willard Storage Battery Div Electric Storage Battery Co 246-286 E 131 St Cleveland 8 Ohio
Winpower Mfg Co Newton Iowa

2G. BATTERY & CHARGING ACCESSORIES

Auxiliary equipment specifically intended to aid in the use and care of batteries and charging equipment, such as cable leads and clamps, testers, charging plugs and regulators.

Allen Electric and Equipment Co 2101-2117 N. Pitcher St Kalamazoo Mich
Anderson (Albert & JM) Mfg Co 289 A St Boston 10 Mass
Belden Mfg Co P O Box 5070A Chicago 80 Ill
Blitz Electric Co 5713 Wentworth Ave Chicago 21 Ill
Bowers Battery & Spark Plug Co Box 1262 Reading Pa
Bryant Mfg Co 410 N Paulina St Chicago 22 Ill
C & D Batteries Div Electric Autolite Co Washington & Cherry Sts Conshohocken Pa
Exide Industrial Div Electric Storage Battery Co Rising Sun & Adams Ave (P O Box 5723) Philadelphia 20 Pa (2b)
Fox Products Co 4720 N 18 St Phila 41 Pa
Gates Electronic Co 4720 N 18 St Phila 41 Pa NY
Goldak Co Inc 1544 W Glenoaks Blvd Glendale 1 Calif
Joy Mfg Co Electrical Products Div 1201 Macklind Ave St Louis 10 Mo
Jordan Electric Products Div Electric Storage Battery Co 222-228 N 2nd St Minneapolis 1 Minn
Mueller Electric Co 1555G E 31 St Cleveland 14 Ohio
New England Electrical Works Inc 365 Main St Lisbon NH
New Jersey Zinc Co 160 Front St New York 38 NY
Ohmite Mfg Co 3601 Howard St Skokie Ill
Penn-Union Electric Corp 315 State St Erie Pa
Russell & Stoll Co Inc 125 Barclay St NY 7 NY
St Marys Carbon Co State St St Marys Pa
Sittler Corp 18 N Ada St Chicago 7 Ill
Stackpole Carbon Co Stackpole St St Marys Pa
Triple-A Specialty Co 2835 N Western Ave Chicago 18 Ill (2b)
Victor Instrument Mfg Co Inc 33 W 60 St New York 23 NY
Walker Brothers End St Conshohocken Pa
Willard Storage Battery Div Electric Storage Battery Co 246-286 E 131 St Cleveland 8 Ohio

TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers* on the Free Information cards elsewhere in this issue.

*Code No.	Description, Pages Catalog No. & Mfr.
2-1	Boost & Buck Transformers; Cat. No. 5A3 (Acme Electric)
2-2	Control Transformers; Cat. No. 14-BL01 (Acme Electric)
2-3	Industrial Rectifiers; 6p; Cat. No. RE1.1a (Allis-Chalmers)
2-4	Silicon Rectifiers; Cat. Nos. 1589432 & 1589298 (Allis-Chalmers)
2-5	Batteries; 11p; Cat. No. CP-540/58 (C & D)
2-6	Batteries; 11p; Cat. No. CP-539/58 (C & D)
2-7	Heavy Duty Batteries; 7p; Cat. No. DL-578/59 (C & D)
2-8	Industrial Truck Batteries; 11p; Cat. No. IT-528/59 (C & D)
2-9	Silicon Chargers; 4p; Cat. No. 100/58 (C & D)
2-10	Battery Chargers; 2p; Cat. No. BC-60 (Christie)
2-11	Rectifiers; 7p; Cat. No. AC-60 (Christie)
2-12	Battery Charger Operation and Maintenance; Cat. No. 5845 (Exide)
2-13	Stationary Batteries; 12p; Cat. No. 4676 (Exide)
2-14	Distribution Transformers; Cat. No. GEA-6070D (General Electric)
2-15	High-Voltage Equipment; 12p; Cat. No. GEZ-2910 (General Electric)
2-16	Self-Protected Distribution Transformers; 24p; Cat. No. GEA-6126B (General Electric)
2-17	Silicon Rectifier Power Supplies; 4p; Cat. No. GEA-6854 (General Electric)
2-18	Transformers; 32p; Cat. No. GEA-6108C (General Electric)
2-19	Transformers; 12p; Cat. No. GEA-6984 (General Electric)
2-20	Power Rectifiers; 8p; Cat. No. 6101-1A (I-T-E)
2-21	Transformers; 15p; Cat. No. 5604-1A (I-T-E)
2-22	Unitrons; 7p; Cat. No. 6101-1A (I-T-E)
2-23	Pad-Mount Transformers For Underground Distribution Systems; Cat. No. DT8 (Line Material)
2-24	Transformer Enclosures; Cat. No. CMI (Line Material)
2-25	Transformers; Cat. No. DT2 (Line Material)
2-26	Accessories for Transformer Cooling Radiators & Tanks; 23p (Shaw-Perkins)
2-27	Transformers; 4p; Cat. No. S-401-C (Standard Transformer)
2-28	Transformers For Metering; Cat. No. S-503 (Standard Transformer)
2-29	Flexiformers; 8p; Cat. No. TP659 (Superior)
2-30	Powerstats; 8p; Cat. No. P559 (Superior)
2-31	Selenium & Silicon Rectifier Power Units; 11p; Cat. No. 2M (Syntron)
2-32	Selenium Rectifiers; 9p; Cat. No. 12560 (Syntron)
2-33	Batteries; 50p (Universal)

SECTION 3. SWITCHING & CONTROL EQUIPMENT

Indicating devices and alarms used in conjunction with switches and controls are listed in Section 10.

3A. UNIT SUBSTATIONS

Complete assemblies for transformation and distribution of primary power.

Acme Electric Corp 45 Water St Cuba NY
Allis-Chalmers Mfg Co 930 S 70th St. Milwaukee 1 Wis
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill
Esco Mfg Co P O Box 1039 Greenville Tex
Federal Pacific Electric Co 50 Paris St Newark 5 NJ
General Electric Co Apparatus Sales Div Schenectady 5 NY
General Electric Co Distribution Assemblies Dept 41 Woodford Ave Plainville Conn (3A)
Hughes Bros Inc Seward Neb
I-T-E Circuit Breaker Co 1900 Hamilton St Philadelphia 30 Pa
Kinney Electrical Mfg Co 678 Buckeye St Elgin Ill
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis
Mullenbach Div Electric Machinery Mfg Co 2100 E 27 St Los Angeles 58 Calif (3A)

Nelson Electric Mfg Co P O Box 5385 Tulsa Okla
Pennsylvania Transformer Div McGraw-Edison Co Box 330 Canonsburg Pa
Royal Electric Mfg Co 1122 E 87 St Chicago 19 Ill
Sorgel Electric Co 8388 W National Ave Milwaukee 4 Wis
Southern Electrical Equipment Co 308 West Bland at Mint St Charlotte 3 NC
Square D Co 6060 Rivard St Detroit 11 Mich
Standard Transformer Co 140 Dana St N E Warren Ohio
●**WESTINGHOUSE ELECTRIC CORP P O Box 868 Pittsburgh 30 Pa—ADV PG 4-69-70-71-72**
Young Electric & Mfg Co Inc 2134 Curtis Denver 2 Colo
Zinsco Electrical Products 729 Turner Los Angeles 12 Calif

3B. SWITCHGEAR

Enclosed assembly of switching and interrupting devices and associated equipment for distribution of power.

Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis
Cleveland Switchboard Co 2925 E 79 St Cleveland 4 Ohio
Continental Electric Equipment Co Box 1055 Cincinnati 1 Ohio
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill
Federal Pacific Electric Co 50 Paris St Newark 5 NJ
G & W Electric Specialty Co 3500 W 127 St Blue Island Ill
General Electric Co Apparatus Sales Div Schenectady 5 NY
●**GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY—ADV PG 2**
Gustaveson Inc 8600 Chestnut St Kansas City 32 Mo
I-T-E Circuit Breaker Co 1900 Hamilton St Philadelphia 30 Pa
Lake Erie Electric Mfg Inc 2952 W 22 St Erie Pa
Marquette Electric Switchboard Co 311 N Desplanes St Chicago 6 Ill
Mullenbach Div Electric Machinery Mfg Co 2100 E 27 St Los Angeles 58 Calif
Nelson Electric Mfg Co P O Box 5385 Tulsa Okla
Pennsylvania Transformer Div McGraw-Edison Co Box 330 Canonsburg Pa
Pyle-National Co 1344 N Kostner Ave Chicago 51 Ill
Russell & Stoll Co Inc 125 Barclay St NY 7 NY
●**S & C ELECTRIC CO 4435 Ravenswood Ave Chicago 40 Ill—ADV PG 142**
Square D Co 6060 Rivard St Detroit 11 Mich
●**WESTINGHOUSE ELECTRIC CORP P O Box 868 Pittsburgh 30 Pa—ADV PG 4-69-70-71-72**
●**WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa—ADV PG 2nd COVER**
Young Electric & Mfg Co Inc 2134 Curtis Denver 2 Colo
Zinsco Electrical Products 729 Turner Los Angeles 12 Calif

3C. SWITCHBOARDS

1. **Metering & control**
2. **Power & light**
3. **Stage**
4. **Laboratory & experimental**

Metering & control boards and panels mount devices used to regulate, indicate and record operation of such equipment as boilers, turbines, furnaces and industrial processing equipment.

Adam (Frank) Electric Co 3647 Windsor Pl St Louis Mo (2-3)
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (1-2)
Alwalt Mfg Co 1706 Lapham Dr Modesto Calif (1)
Capitol Stage Lighting Co Inc 527 W 45 St New York 36 NY
Century Lighting Inc 521 W 43 St New York 36 NY (3)
Clement Electric Co 223 Erie St N W Grand Rapids 2 Mich (1-2)
Cleveland Switchboard Co 2925 E 79 St Cleveland 4 Ohio (1-2-3)
Continental Electric Equipment Co Box 1055 Cincinnati 1 Ohio (1-2-3)
Control Panel Corp 517 W Monroe St Chicago 6 Ill (1)
Cutler-Hammer Inc 228 N 12th St Milwaukee 1 Wis (2)
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill (1-2)
Dixie Controller Inc Post Office Box 5844 Birmingham 9 Ala (1)
Electric Machinery Mfg Co 800 Central Ave Minneapolis 13 Minn (1-2)
Esco Mfg Co P O Box 1039 Greenville Tex (2)
Federal Pacific Electric Co 50 Paris St Newark 5 NJ (2)
Gemco Electric Co 25685 W Eight Mile Rd Detroit 40 Mich (1-2)
General Electric Co Apparatus Sales Div Schenectady 5 NY (1-2)
General Electric Co Distribution Assemblies Dept 41 Woodford Ave Plainville Conn (1)
Gustaveson Inc 8600 Chestnut St Kansas City 30 Mo (2-3)
Hub Electric Co 2255 W Grand Ave Chicago 12 Ill (3)
I-T-E Circuit Breaker Co 1900 Hamilton St Philadelphia 30 Pa (1-2)
Ideal Electric and Mfg Co East First St Mansfield Ohio (1-2)
Kato Engineering Co 1442 First Ave Mankato Minn (1)
Kinney Electrical Mfg Co 678 Buckeye St Elgin Ill (2)
Kliegl Bros Universal Electric Stage Lighting Co Inc 321 W 50 St NY 19 NY (3)
Lake Erie Electric Mfg Inc 2952 W 22 St Erie Pa (1-2-3)
Lake Shore Electric Corp 205 Willis St Bedford Ohio (2)
Leeds & Northrup Co 4970 Stenton Ave Phila 44 Pa (1)
Machinery Electrification Inc 56 Hudson St Northboro Mass (2)
Major Equipment Co Inc 4603 W Fullerton Ave Chicago 39 Ill (3)
Marquette Electric Switchboard Co 311 N Desplaines St Chicago 6 Ill (2)
Mullenbach Div Electric Machinery Mfg Co 2100 E 27 St Los Angeles 58 Calif (2)
Nelson Electric Mfg Co P O Box 5385 Tulsa Okla (1-2)
Parker Electrical Mfg Co 221 Washington St Oakland 7 Calif (2)
Russell & Stoll Co Inc 125 Barclay St NY 7 NY (2)
S & C Electric Co 4435 Ravenswood Ave Chicago 40 Ill (2)
Southern Electrical Equipment Co 308 West Bland at Mint St Charlotte 3 NC (2)
Square D Co 6060 Rivard St Detroit 11 Mich (2-3)
Standard Electric Time Co 89 Logan St Springfield 2 Mass (4)
Superior Electric Co 83 Laurel St Bristol Conn (3)
Viking Instruments Inc East Haddam Conn (1)
●**WESTINGHOUSE ELECTRIC CORP P O Box 868 Pittsburgh 30 Pa (1-2)—ADV PG 4-69-70-71-72**
●**WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1-2)—ADV PG 2nd COVER**
Young Electric & Mfg Co Inc 2134 Curtis Denver 2 Colo (1-2-3)
Zinsco Electrical Products 729 Turner Los Angeles 12 Calif (1-2-3)

3D. PANELS & PANELBOARDS

1. **Service, lighting & power**
2. **Explosion-proof**
3. **Trailer Park**

For circuit division and protection.

Adam (Frank) Electric Co 3647 Windsor Pl St Louis Mo (1)
Alwalt Mfg Co 1706 Lapham Dr Modesto Calif (1)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 Ill (3)
BullDog Electric Products Div I-T-E Circuit Breaker Co 7610 Joseph Campau Detroit Mich (1)
Cleveland Switchboard Co 2925 E 79 St Cleveland 4 Ohio (1)
Continental Electric Equipment Co Box 1055 Cincinnati 1 Ohio (1)
●**CROUSE-HINDS CO Syracuse 1 NY (2)—ADV PG 4th COVER**
●**CUTLER-HAMMER INC 228 N 12th St Milwaukee 1 Wis (1)—ADV PG 80-81**
Federal Pacific Electric Co 50 Paris St Newark 5 NJ (1)
General Electric Co Circuit Protective Devices Dept 41 Woodford Ave Plainville Conn (1)
General Electric Co Distribution Assemblies Dept 41 Woodford Ave Plainville Conn (1)
General Switch Co 45 Roebling St Brooklyn 11 NY (1)
Gustaveson Inc 8600 Chestnut St Kansas City 30 Mo (1)
Hoffman Engineering Corp 1050 Tyler St Anoka Minn (3)
●**KILLARK ELECTRIC MFG CO 3940 Easton Ave St Louis 13 Mo (1-2)—ADV PG 86-87**
Kinney Electrical Mfg Co 678 Buckeye St Elgin Ill (1)
Kolton Electric Mfg Co 123 New Jersey Railroad Ave Newark 5 NJ
Lake Erie Electric Mfg Inc 2952 W 22 St Erie Pa (1)
Machinery Electrification Inc 56 Hudson St Northboro Mass (1)
Midwest Electric Products Inc 1515 N Front St Mankato Minn (1)
Mullenbach Div Electric Machinery Mfg Co 2100 E 27 St Los Angeles 58 Calif (1)
Murray Mfg Corp 1250 Atlantic Ave Brooklyn 16 NY (1)
Nelson Electric Mfg Co P O Box 5385 Tulsa Okla (1)
Parker Electrical Mfg Co 221 Washington St Oakland 7 Calif (1)
Pyle-National Co 1344 N Kostner Ave Chicago 51 Ill
Russell & Stoll Co Inc 125 Barclay St NY 7 NY (1-2)
Square D Co 6060 Rivard St Detroit 11 Mich (1)
Sun Electric Products Inc 28 S Day St Orange NJ (1)
United Enterprises 15735 S Paramount Blvd Paramount Calif (3)
●**WADSWORTH ELECTRIC MFG CO INC 20-34 W 11th St (Box 272) Covington Ky (1)—ADV PG 140-141-143**
●**WESTINGHOUSE ELECTRIC CORP P O Box 868 Pittsburgh 30 Pa (1-2)—ADV PG 4-69-70-71-72**
●**WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1)—ADV PG 2nd Cover**
Young Electric & Mfg Co Inc 2134 Curtis Denver 2 Colo (1)
Zinsco Electrical Products 729 Turner Los Angeles 12 Calif (1)

3E. FRAMING & ENCLOSURES

Metal framing members, enclosures, and mounting structures for substation, switching, and control equipment.

Acme Steel Co 135th St & Perry Ave Chicago 27 Ill
American Steel & Iron Works 5801 S Lowe Ave Chicago 21 Ill
Chicago Wire Iron & Brass Works 2411 W Belmont Ave Chicago 18 Ill
Continental Electric Equipment Co Box 1055 Cincinnati 1 Ohio
Eliza Metal Products Co Box 408 Bridgeville Pa
Falstrom Co 62 Falstrom Ct Passaic NJ
Gustaveson Inc 8600 Chestnut St Kansas City 30 Mo
Handy Angle Div Lug-All Co 355 Lancaster Ave Haverford Pa
●**HOFFMAN ENGINEERING CORP 1050 Tyler St Anoka Minn—ADV PG 122-134**
●**HUENEFELD CO ENGINEERED PRODUCTS DIV 2701 Spring Grove Ave Cincinnati 25 Ohio—ADV PG 115**
I-T-E Circuit Breaker Co Greensburg Div P O Box 98 Greensburg Pa
●**KEYSTONE MFG CO 23328 Sherwood Rd Warren Mich—ADV PG 133-139**
Kirk & Blum Mfg Co 3120 Forrer St Cincinnati 9 Ohio
Mult-A-Frame Div Ainsworth Precision Castings Co 1471-77 E Atwater St Detroit 7 Mich
Parker Electrical Mfg Co 221 Washington St Oakland 7 Calif
Queen Products Co Inc Thirteenth & Rowan Sts Louisville 3 Ky
R & IE Equipment Div I-T-E Circuit Breaker Co Greensburg Pa
Russell & Stoll Co Inc 125 Barclay St NY 7 NY
Spring City Electrical Mfg Co Spring City 85 Pa
●**STEEL CITY ELECTRIC CO 1207 Columbus Ave Pittsburgh 33 Pa—ADV PG 131**
Unistrut Products Co 933 Washington Blvd Chicago 7 Ill
Versabar Corp 14 Whyte St Jersey City NJ
Wisconsin Electrical Mfg Co Inc 1237 S Third St Milwaukee 4 Wis
Young Electric & Mfg Co Inc 2134 Curtis Denver 2 Colo

3F. PRIMARY SWITCHES

Switches (over 600v) for distribution pole lines, structures and equipment.

Chance (A B) Co 210 North Allen St Centralia Mo
Continental Electric Equipment Co Box 1055 Cincinnati 1 Ohio
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill
Electrical Engineers Equipment Co 25th Ave & Division St Melrose Park Ill
Federal Pacific Electric Co 50 Paris St Newark 5 NJ
G & W Electric Specialty Co 3500 W 127 St Blue Island Ill
General Electric Co Apparatus Sales Div Schenectady 5 NY
Graybar Electric Co Inc 420 Lexington Ave NY 17 NY
I-T-E Circuit Breaker Co 1900 Hamilton St Philadelphia 30 Pa (3f)
Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 Ill
Kearney (James R) Corp 4236 Clayton Ave St Louis 10 Mo
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis
Memco Engineering & Mfg Co Inc Commack LI NY
Powercraft Corp 2215 De Kalb St St Louis 4 Mo
Powerdyne Inc 17150 Boones Ferry Rd Oswego Ore
Royal Electric Mfg Co 1122 E 87 St Chicago 19 Ill
S & C Electric Co 4435 Ravenswood Ave Chicago 40 Ill
Southern Electrical Equipment Co 308 West Bland at Mint St Charlotte 3 NC

Square D Co 6060 Rivard St Detroit 11 Mich
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa

3G. POWER SWITCHES

1. Automatic transfer
2. Dead-front switchboard
3. Isolating
4. Knife
5. Oil
6. Safety
7. Service entrance
8. Explosion-proof

Switches (600v and less) for power distribution purposes.

Adam (Frank) Electric Co 3647 Windsor Pl St Louis Mo (4-6-7)
Allen-Bradley Co 136 W Greenfield Ave Milwaukee 4 Wis (1-8)
American Electric Switch Div Clark Controller Co 1146 E 152 St Cleveland 10 Ohio (6-7)
Anderson (Albert & JM) Mfg Co 289 A St Boston 10 Mass (4)
Arrow-Hart & Hegeman Electric Co 103 Hawthorn St Hartford 6 Conn (6-7-8)
●**AUTOMATIC SWITCH CO 50-56 Hanover Rd Florham Pk NJ (1)—ADV PG 92**
Barber Electric Mfg Co Inc 30 Chestnut St N Attleboro Mass (4-6-7)
Barkelew Electric Mfg Co 1905 Columbia Ave Middletown Ohio (2-4)
BullDog Electric Products Div I-T-E Circuit Breaker Co 7610 Joseph Campau Detroit Mich (6-7)
Clark Controller Co 1146 E 152 St Cleveland 10 Ohio (4-7-8)
Connecticut Electric Mfg Co Main St Bantam Conn (4)
●**CROUSE-HINDS CO Syracuse 1 NY (6)—ADV PG 4th Cover**
Cutler-Hammer Inc 228 N 12th St Milwaukee 1 Wis (1-2-3-4-6-7-8)
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill (1-6)
Derrick Light & Equipment Co 1201 E Daggett (P O Box 414) Fort Worth Tex (8)
Electric Distribution Products Inc 2200 31st St S W Allentown Pa (6)
Electro-Snap Switch & Mfg Co 4218-30 W Lake St Chicago 24 Ill (8)
Esco Mfg Co P O Box 1039 Greenville Tex
Federal Pacific Electric Co 50 Paris St Newark 5 NJ (6)
●**G & W ELECTRIC SPECIALTY CO 3500 W 127 St Blue Island Ill (1-5)—ADV PG 110**
Gemco Electric Co 25685 W Eight Mile Rd Detroit 40 Mich (8)
General Electric Co Apparatus Sales Div Schenectady 5 NY (1 thru 6-8)
●**GENERAL ELECTRIC CO Circuit Protective Devices Dept 41 Woodford Ave Plainville Conn (4-6-7-8)—ADV PG 107**
General Switch Co 45 Roebling St Brooklyn 11 NY (6-7)
Graybar Electric Co Inc 420 Lexington Ave NY 17 NY (1-4-5-6-7)
Hoffman Engineering Corp 1050 Tyler St Anoka Minn (4)
●**HOPE ELECTRICAL PRODUCTS CO INC 27 Long Ave Hillside NJ (8)—ADV PG 106**
I-T-E Circuit Breaker Co 1900 Hamilton St Philadelphia 30 Pa (2)
I-T-E Circuit Breaker Co Greensburg Div P O Box 98 Greensburg Pa (3)
Kearney (James R) Corp 4236 Clayton Ave St Louis 10 Mo (3)
Kolton Electric Mfg Co 123 New Jersey Railroad Ave Newark 5 NJ (6)
Lake Shore Electric Corp 205 Willis St Bedford Ohio (1)
●**KILLARK ELECTRIC MFG CO 3940 Easton Ave St Louis 13 Mo (6-7-8)—ADV PG 86-87**
Lumenite Electronic Corp 407 S Dearborn St Chicago 5 Ill (1)
Midwest Electric Products Inc 1515 N Front St Mankato Minn (7)
Monitor Controller Co 99 Grove St Rockland Mass (1)
Murray Mfg Corp 1250 Atlantic Ave Brooklyn 16 NY (6-7)
Palmer Electric & Mfg Co 24 Water St Wakefield Mass (1-6-7)
Parker Electrical Mfg Co 221 Washington St Oakland 7 Calif (6-7)
Powercraft Corp 2215 De Kalb St St Louis 4 Mo (3-4)
Pringle Electrical Mfg Co 1900-1912 N Sixth St Philadelphia 22 Pa (3-4-7)
Pyle-National Co 1344 N Kostner Ave Chicago 51 Ill (6-8)
Russell & Stoll Co Inc 125 Barclay St NY 7 NY (8)
Sangamo Electric Co 11th & Converse Springfield Ill (5)
Sierra Electric Corp 15100 S Figueroa Gardena Calif (4)
Square D Co 6060 Rivard St Detroit 11 Mich (1-4-6-7-8)
Unimax Switch Div W L Maxson Corp Ives Rd Wallingford Conn (8)
●**WADSWORTH ELECTRIC MFG CO INC 20-34 W 11th St (Box 272) Covington Ky (4-6-7)—ADV PG 140-141-143**
●**WESTINGHOUSE ELECTRIC CORP P O Box 868 Pittsburgh 30 Pa (1-2-3-4-5-7-8)—ADV PG 4-69-70-71-72**
Westinghouse Electric Corp Standard Control Div Beaver Pa (6)
●**WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1 thru 8)—ADV PG 2nd Cover**
Young Electric & Mfg Co Inc 2134 Curtis Denver 2 Colo (1-2-3-7)
●**ZENITH ELECTRIC CO 155 W Walton St Chicago 10 Ill (1)—ADV PG 135**
Zinsco Electrical Products 729 Turner Los Angeles 12 Calif (2-6)

3H. CONTROLS & CONTROL SWITCHES

1. Centrifugal
2. Flashing
3. Flow
4. Foot-operated
5. Footmat-operated
6. Key-operated
7. Limit (lever, toggle or pushbutton)
8. Liquid level (float)
9. Mercury
10. Photoelectric
11. Pressure or vacuum
12. Remote control
13. Rotary tap
14. Timing
15. Miniature & subminiature
16. Molded power cord
17. Snap
18. Portable, heavy duty
19. Proximity

Physically actuated devices performing control functions through the energizing or de-energizing of electrical circuits.

A G A Div Elastic Stop Nut Corp. of America 1027 Newark Ave Elizabeth NJ (14)
Abrams Instrument Corp., 606 E Shiawasee St Lansing Mich (10-14)
Acme Fire Alarm Company Inc 106 Seventh Ave New York 11 NY (8)
Acro Switch Div Robertshaw-Fulton Controls Co 2040 E Main St Columbus 16 Ohio (7-14-15)
Aemco Inc 10 State St Mankato Minn (2-14)
Aero Instrument Co 11423 Vanowen St North Hollywood Calif (11)
Allen-Bradley Co 136 W Greenfield Ave Milwaukee 4 Wis (4-7-8-11-13-14)
Almo Mfg Co 618 Jersey Ave Union Beach NJ (9)
Arrow-Hart & Hegeman Electric Co 103 Hawthorn St Hartford 6 Conn (13)
AutoFYRstop Co 2035 Washington Ave Phila 46 Pa (14)
Automatic Control Co 995 University Ave St Paul 4 Minn (3-8-9-11-12-14)
Automatic Devices 714 Hillgrove Ave Western Springs Ill (14)
●**AUTOMATIC SWITCH CO 50-56 Hanover Rd Florham Pk NJ (2-3-12)—ADV PG 92**
Automation Products Inc 3030 Max Roy St Houston 24 Tex (8)
Autotron Inc 3629 N Vermilion St Danville Ill (10-14)
B/W Controller Corp 2200 E Maple Rd Birmingham Mich (8)
Barkelew Electric Mfg Co 1905 Columbia Ave Middletown Ohio (13)
Barksdale Valves 5125 Alcoa Ave Los Angeles 58 Calif (11)
Beckley Electric Co Inc 468-470 Grand Ave Brooklyn 38 NY (2)
Bristol Motor Div Vocaline Co of America Inc Coulter St Old Saybrook Conn (14)
Cherry Electrical Products Corp 1650 Deerfield Rd Highland Park Ill (17)
Cincinnati Time Recorder Co 1733 Central Ave Cincinnati 14 Ohio (14)
Clark Controller Co 1146 E 152 St Cleveland 10 Ohio (4-7-10)
Clark-Cooper Co Inc 317 N Market St Palmyra NJ (7)
Com-Pak-Ett Mfg Corp 650 Grand St Allegan Mich (10)
Control Switch Div Controls Co of America 4218-30 W Lake St Chicago 24 Ill (7-15)
Controls Co of America 2450 N 32 St Milwaukee 45 Wisc (3-8-11-14-17)
Convair Inc P O Box 9671 Pittsburgh 16 Pa (3)
Counter & Control Corp 4503 W Brown Deer Rd Milwaukee 23 Wis (13-14)
Cramer Controls Corp Main St Centerbrook Conn (14)
Crouse-Hinds Co Syracuse 1 NY (2)
Cutler-Hammer Inc 228 N 12th St Milwaukee 1 Wis (1-3-4-6-7-8-10-11-15)
Daystrom Inc Weston Instruments Div 614 Frelinghuysen Ave Newark 12 NJ (11)
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill (13)
Denison (R B) Mfg Co 386 Broadway Bedford Ohio (7)
Dependable-Electric Mfg Co Inc 537 Johnson Ave Brooklyn 37 NY (2)
Detroit Controls Div American-Standard 5900 Trumbull Ave Detroit 8 Mich (11)
Dietz (Henry G) Co Inc 12-16 Astoria Blvd Long Island City 2 NY (11-14)
Durant Mfg Co 1900 N Buffum St Milwaukee 1 Wis (10)
Dwyer (F W) Mfg Co Woodland at Greenwood (P O Box 373) Michigan City Ind (11)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (2)
Eastern Specialty Co 3617 N 8th St Phila 40 Pa (13)
Edco International Corp 20722 W Seven Mile Rd Detroit 19 Mich (14)
Electra Mfg Co 4051 Broadway Kansas City Mo (7-11)
Electric Switch Corp 2320 S Tibbs Ave P O Box 41037 Indianapolis 41 Ind (9-14)
Electrical Mfg Co 425 Lake Ave Racine Wis (4)
Electro-Snap Switch & Mfg Co 4218-30 W Lake St Chicago 24 Ill (7-15)
Electronic Control Corp 1573 E Forest Ave Detroit 7 Mich (10)
Electronics Corp of America One Memorial Dr Cambridge Mass (10-12-14-15)
Euclid Electric & Mfg Co 50 Edwards St Madison Ohio (1)
Ewald Instruments Box 124P Kent Conn (14)
Exide Industrial Div Electric Storage Battery Co Rising Sun & Adams Ave (P O Box 5723) Philadelphia 20 Pa (14)
Farmer Electric Products Co Inc 2300 Washington St Newton Lower Falls 62 Mass (10-14)
Fisher-Pierce Co 170 Pearl St South Braintree 85 Mass (10)
Furnas Electric Co 1067 McKee St Batavia Ill (4-7-8-11-13)
Gem Electric Mfg Co Inc 237 37th St Brooklyn NY (2)
Gemco Electric Co 25685 W Eight Mile Rd Detroit 40 Mich (7)
General Control Co 1200 Soldiers Field Rd Boston 34 Mass (4-14)
General Controls Co 801 Allen Ave Glendale Calif (3-4-7-9-11-14)
General Electric Co Air Conditioning Div Home Heating & Cooling Dept Troup Highway Tyler Tex (14)
General Electric Co Apparatus Sales Div Schenectady 5 NY (4-7-8-10 thru 14)
Grayhill Inc 551 Hillgrove Ave La Grange Ill (7-13)
Haft & Sons Inc 950 Kent Ave Brooklyn 5 NY (2)
Haledy Electronics Co 57 William St NY 5 NY (2-3-8-9-10-11)
Hankscraft Co Control Div Reedsburg Wis (14)
Haydon (A W) Co 232 N Elm St Waterbury Conn (14)
Haydon Div General Time Corp 245 E Elm St Torrington Conn (14)
Hays Mfg Co Automatic Controls Div 12th and Liberty Sts Erie 6 Pa (3)
Healy-Ruff Co Water Level Controls Div 2255 University Ave St Paul 14 Minn (8-11-12)
Heat-Timer Corp 657 Broadway New York 12 NY (14)
Hughey & Phillips Inc 3200 North San Fernando Blvd Burbank Calif (2-10)
Hypro Engineering Inc 700 39th Ave N E Minneapolis 21 Minn (11)
Industrial Automation Corp 2415 W Montrose Ave Chicago Ill (2-9)
●**INTERNATIONAL REGISTER CO 2620 W Washington Blvd Chicago 12 Ill (14)—ADV PG 105**
Iron Fireman Mfg Co Electronics Div 2838 S E 9th Ave Portland 2 Ore (14)
Jo-Bell Products Inc 5456 W 111 St Oak Lawn Ill (8-19)
Jordan Electronics 3025 W Mission Rd Alhambra Calif (14)
Joy Mfg Co Electrical Products Div 1201 Macklind Ave St Louis 10 Mo (16-18)
Kneisley Electric Co 2501-2509 Lagrange St Toledo 3 Ohio (13)
Kulka Electric Corp 633 S Fulton Ave Mount Vernon NY (2)
Leviton Mfg Co Inc 236 Greenpoint Ave Brooklyn 22 NY (2-7)
Lewis Engineering Co 52 Rubber Ave Naugatuck Conn (13)
Licon Switch & Control Div Illinois Tool Works 6606 W Dakin St Chicago 34 Ill (7-15-18)
Line Electric Co 229 River St Orange NJ (4)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (10)
Linemaster Switch Corp Woodstock Conn (4)
Machinery Electrification Inc 56 Hudson St Northboro Mass (8)
Magnetrol Inc 2110 S Marshall Blvd Chicago 23 Ill (3-8)
Mallory (P R) & Co Inc 30 S Gray St Indianapolis 6 Ind (13-14)
Manning Maxwell & Moore Inc 250 E Main St Stratford Conn (8-11-12)
McDonnell & Miller Inc 3500 N Spaulding Ave Chicago 18 Ill (3-8)
Mercoid Corp 4201 W Belmont Ave Chicago 41 Ill (9)
Micro Balancing Inc 191 Herricks Rd Garden City Park NY (10)
Micro Switch Div of Minneapolis-Honeywell Regulator Co Chicago & Spring Freeport Ill (4-7-9-12-13-15)
Midwest Electric Products Inc 1515 N Front St Mankato Minn (14)
Miller Harris Instrument Co 1134 S First St Milwaukee 4 Wis (14)
Minneapolis-Honeywell Regulator Co 2753 Fourth Ave S Minneapolis 8 Minn (11-14)

Monitor Controller Co 99 Grove St Rockland Mass (7)
Mossman (Donald P) Inc P O Box 265 Brewster NY (7)
Nankervis (Geo L) Co 15300 Fullerton Ave Detroit 27 Mich (7)
National Acme Co Electrical Controls Div 170 E 131 St Cleveland 8 Ohio (7)
National Time & Signal Corp 21800 Wyoming Ave Detroit 37 Mich (14)
Noel Mfg Co 3 W 18 St New York 11 NY (2)
Ohmite Mfg Co 3601 Howard St Skokie Ill (13)
●PARAGON ELECTRIC CO 1600-12th St Two Rivers Wis (14)—ADV PG 124
Partlow Corp 230 Campion Rd New Hartford NY (7-14)
Partrick & Wilkins Co 51 N Seventh St Phila 6 Pa (5-6)
Penn Controls Inc Goshen Ind (3-8-11)
Photobell Co Inc 43 Vesey St New York 7 NY (10)
Photomation Inc 96 S Washington Ave Bergenfield NJ (10-15)
Post Electronic Products 140 Elliott St Beverly Mass (14)
Powrex Switch Co 36 Pleasant St Watertown Mass (9)
●PROGRESS MFG CO INC Castor Ave & Tulip St Phila 34 Pa (10)—ADV PG 138
Recora Co Inc Powis Rd (Box 68) St Charles Ill (4-5)
●RELIANCE AUTOMATIC LIGHTING CO 1927 Mead St Racine Wis (14)—ADV PG 136
Reynolds Electric Co 3000 River Rd River Grove Ill (2)
Rhodes (M H) Inc 30 Bartholomew Ave Hartford 6 Conn (14)
Ripley Co Inc Factory St Middletown Conn (10)
Robot Industries Inc 7041 Orchard St Dearborn Mich (5)
Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa (2)
Roth Mfg Co 6420 W Howard St Chicago 31 Ill (10)
Sangamo Electric Co 11th & Converse Springfield Ill (14)
Sargent Electric Corp 630 Merrick Rd Lynbrook NY (7)
Scaico Controls Inc P O Box 41 Delanco NJ (11-12-15)
Seely Instrument Co Inc 377 Fourth St (P O Box 387) Niagara Falls NY (14)
Shallcross Mfg Co Preston St Selma NC (7-13)
Square D Co 6060 Rivard St Detroit 11 Mich (4-6-7-8-11-12-13-14)
Standard Electric Time Co 89 Logan St Springfield 2 Mass (14)
Star-A Electric Mfg Co Inc 269 Meserole St Brooklyn 6 NY (2)
Supreme Electric Products Co 194 Vassar St Rochester 7 NY (14)
Technical Electronics Co 4060 Ince Blvd Culver City Calif (14)
Tigerman Engineering Co 4332 N Western Ave Chicago 18 Ill (9)
Tork Time Controls Inc 1000 Grove St Mt Vernon NY (14)
Unimax Switch Div W L Maxson Corp Ives Rd Wallingford Conn (4-7)
U S Relay-Electronics 717 N Coney Ave Azusa Calif (15)
Vacuum Tube Products Co Inc 2020 Short St Oceanside Calif (14)
Vemaline Products Co P O Box 222 Hawthorne NJ (4-14)
Viking Instruments Inc East Haddam Conn (2-3-8-11)
Wallace & Tiernan Inc 25 Main St Belleville NJ (2)
Waiser Automatic Timer Corp 420 Lexington Ave New York 17 NY (14)
Warrick (Chas F) Co 1964 W Eleven Mile Rd Berkley Mich (8)
Webster Electric Co 1900 Clark St Racine Wisc (14)
Weltronic Co 19500 W Eight Mile Rd Detroit 41 Mich (14)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1-9-12-14-15)
Westinghouse Electric Corp Standard Control Div Beaver Pa (7-8)
White-Rodgers Co 1209 Cass Ave St Louis 6 Mo (7-11-12)
Wilson (G C) & Co 1915 Eighth Ave Huntington W Va (14)
Winterburn Mfg Co P O Box 386 Putnam Conn (3)
Workrite Mfg Co 612-620 Colorado Ave Santa Monica Calif (4-7-11)
●ZENITH ELECTRIC CO 155 W Walton St Chicago 10 Ill (12-14)—ADV PG 135

3J. EQUIPMENT SWITCHES & CONTROLS

1. Appliance switches
2. Battery switches & charging controls
3. Door & gate openers
4. Electric fence controllers
5. Electroplating controls
6. Generator controls
7. Heating system & temperature controls
8. Light dimmers
9. Street-lighting controls
10. Switch-operating mechanisms
11. Welder controls
12. Crane controls
13. Pump controls

Devices intended for use with specific items of equipment.

Acme Wire Co Electrical Utilities Div 1255 Dixwell Ave New Haven Conn (9)
Acro Switch Div Robertshaw-Fulton Controls Co 2040 E Main St Columbus 16 Ohio (1-7)
Air-Hydraulics of Indiana 7769 Lafayette Rd New Augusta Ind (11)
Ajax Electric Co 954 Frankford Ave Phila 23 Pa (7)
Allen-Bradley Co 136 W Greenfield Ave Milwaukee 4 Wis (7)
Alliance Mfg Co Inc Lake Park Blvd Alliance Ohio (3)
Ark-Les Switch Corp 51 Water St Watertown Mass (1)
Arrow-Hart & Hegeman Electric Co 103 Hawthorn St Hartford 6 Conn (1)
Assembly Products Inc Chesterland 31 Ohio (7)
Atlas Overhead Door Co Mill St at Reading Railroad Quakertown Pa (3)
Automatic Control Co 995 University Ave St Paul 4 Minn (7-10)
Automatic Devices 714 Hillgrove Ave Western Springs Ill (7)
Berko Electric Mfg Corp 212-40 Jamaica Ave Queens Village 28 NY (7)
Bryant Electric Co 1421 State St (Box D Barnum Sta) Bridgeport 2 Conn (1)
Burling Instrument Co Inc 16 River Rd Chatham NJ (7)
Capitol Stage Lighting Co Inc 527 W 45 St New York 36 NY (8)
Ceilheat Inc 5212 Homberg Drive Knoxville Tenn (7)
Century Lighting Inc 521 W 43 St New York 36 NY (8)
Circle F Mfg Co 720 Monmouth St Trenton 4 NJ (1-2)
Cold Cathode Lighting Corp 76 S Bayles Ave Port Washington NY (8)
Columbia Electric Mfg Co 4519 Hamilton Ave Cleveland 14 Ohio (5)
Connecticut Electric Mfg Co Main St Bantam Conn (2)
Controls Co of America 2450 N 32 St Milwaukee 45 Wisc (1-7-10)
Counter & Control Corp 4503 W Brown Deer Rd Milwaukee 23 Wis (10)
Crane (H W) Co 15 N 9th Ave Maywood Ill (3)
Cutler-Hammer Inc 228 N 12th St Milwaukee 1 Wis (1-5-7-10-12-15)
Day-Ray Products Inc 1133 Mission St South Pasadena Calif (8)
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill (10)
Detroit Controls Div American-Standard 5900 Trumbull Ave Detroit 8 Mich (1-7)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (1)
Easy-Heat Inc 555 N Michigan St Lakeville Ind (7)
Ebert Electronics Corp 212-26 Jamaica Ave Queens Village 28 LI NY (9)
Edco International Corp 20722 W Seven Mile Rd Detroit 19 Mich (1)
Ederer Engineering Co 2943 1st Ave S Seattle 4 Wash (12)
Edwards Co Inc Norwalk Conn (3)
Electric Machinery Mfg Co 800 Central Ave Minneapolis 13 Minn (6)
Electric Power Door Co 2127 E Lake St Minneapolis 7 Minn (3)
Electric Service Systems Inc 1330 Quincy St N E Minneapolis 13 Minn (4)
Electronic Control Corp 1573 E Forest Ave Detroit 7 Mich (3)
Electronics Corp of America One Memorial Dr Cambridge Mass (3-9)
Electrovector Inc 475 Flushing Ave Brooklyn 5 NY (7)
Engelhard (Charles) Inc 850 Passaic Ave East Newark NJ (7)
Exide Industrial Div Electric Storage Battery Co Rising Sun & Adams Ave (P O Box 5723) Philadelphia 20 Pa (2)
Federal Pacific Electric Co 50 Paris St Newark 5 NJ (1)
Fenwal Inc Pleasant St Ashland Mass (7)
Fisher-Pierce Co 170 Pearl St South Braintree 85 Mass (9)
Friez Instrument Div Bendix Aviation Corp Baltimore 4 Md (7)
General Controls Co 801 Allen Ave Glendale Calif (7)
General Electric Co Apparatus Sales Div Schenectady 5 NY (5-6-7-9-10-11)
General Electric Co Circuit Protective Devices Dept 41 Woodford Ave Plainville Conn (2)
General Electric Co Wiring Device Dept 95 Hathaway St Providence RI (1-7)
Guardian Electric Mfg Co 1621 W Walnut St Chicago 12 Ill (1)
H-B Instrument Co American & Bristol Sts Philadelphia 40 Pa (7-9)
Hankscraft Co Control Div Reedsburg Wis (7)
Harnischfeger Corp 4400 W National Ave Milwaukee 46 Wis (12)
Hart Mfg Co 164 Bartholomew Ave Hartford Conn (7)
Howell Mfg Co 21 N Morehall Rd Paoli Pa (3)
Hubbell (Harvey) Inc State St & Bostwick Ave Bridgeport 2 Conn (1)
Ideal Electric and Mfg Co East First St Mansfield Ohio (6)
Illinois Testing Laboratories Inc 420 N LaSalle St Chicago 10 Ill (7)
International Electric Fence Co Inc Box 650 Albert Lea Minn (4)
Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 Ill (9)
Kato Engineering Co 1442 First Ave Mankato Minn (6)
Knox Porcelain Corp 2706 Mynders Ave (P O Box 2031) Knoxville 1 Tenn (2)
Kulka Electric Corp 633 S Fulton Ave Mount Vernon NY (8)
Lake Shore Electric Corp 205 Willis St Bedford Ohio (6)
Leviton Mfg Co Inc 236 Greenpoint Ave Brooklyn 22 NY (1-2)
Lincoln Electric Co 22801 St Clair Ave Cleveland 17 Ohio (11)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (9)
Magnetrol Inc 2110 S Marshall Blvd Chicago 23 Ill (13)
Marquette Electric Switchboard Co 311 N Desplaines St Chicago 6 Ill (6)
Marsh Instrument Co 3501 Howard St Skokie Ill (7)
McCorkle (D H) Co Box 97 Station A Berkeley Calif (7)
McLarty Systems 2600 Dickman Rd Battle Creek Mich (7)
Mechanical Industries Production Co 217-223 Ash St Akron 8 Ohio (7)
Memco Engineering & Mfg Co Inc Commack LI NY (10)
Mercoid Corp 4201 W Belmont Ave Chicago 41 Ill (7)
Micro Switch Div of Minneapolis-Honeywell Regulator Co Chicago & Spring Freeport Ill (1)
Minneapolis-Honeywell Regulator Co 2753 Fourth Ave S Minneapolis 8 Minn (7-8)
Minneapolis-Honeywell Regulator Co Boston Div 40 Life St Boston 35 Mass (7)
Minneapolis-Honeywell Regulator Co Industrial Div Wayne & Windrim Aves Phila 44 Pa (7)
Modernheat Cable Corp P O Box 754 Kingsport Tenn (7)
National Cathode Corp 317 E 34 St New York 16 NY (8)
Palmer Electric & Mfg Co 24 Water St Wakefield Mass (7)
Pass & Seymour Inc Syracuse 9 NY (1)
Penn Controls Inc Goshen Ind (7)
Precision Thermometer & Instrument Co 1434 Brandywine St Philadelphia 30 Pa (7)
●PROGRESS MFG CO INC Castor Ave & Tulip St Phila 34 Pa (8)—ADV PG 138
Pyramid Instrument Corp 630 Merrick Rd Lynbrook NY (7)
Quincy Mfg Co Box 916 Tiffin Ohio (3)
Rhodes (M H) Inc 30 Bartholomew Ave Hartford 6 Conn (1)
Richards-Wilcox Mfg Co 150 Third St Aurora Ill (3)
Ripley Co Inc Factory St Middletown Conn (9)
Roberson Inc 1539 E 103 St Seattle 55 Wash (7)
Robot Industries Inc 7041 Orchard St Dearborn Mich (3)
Robotron Corp 21300 W Eight Mile Rd Detroit 19 Mich (11)
Roth Mfg Co 6420 W Howard St Chicago 31 Ill (9)
Sargent Electric Corp 650 Merrick Rd Lynbrook NY (1)
Scaico Controls Inc P O Box 41 Delanco NJ (7)
Shox-Stok Inc Wellington Ohio (4)
Signet Controls 3205 S E 13th Ave Portland 2 Ore (7)
Simplex Co Inc 1139-41 N MacArthur Blvd Springfield Ill (6)
Slater Electric & Mfg Co Inc 45 Sea Cliff Ave Glen Cove NY (1)
Smith-Gates Corp Farmington Conn (7)
Square D Co 6060 Rivard St Detroit 11 Mich (8)
Stackpole Carbon Co Stackpole St St Marys Pa (1)
Sunwarm Inc 1601 Jared Dr (P O Box 266) Kingsport Tenn (7)
Superior Electric Co 83 Laurel St Bristol Conn (8)
Swan Mfg Co 1801 W 26 St Vancouver Wash (7)
Taylor-Winfield Corp 1052 Mahoning Ave N W Warren Ohio (11)
Thermo Electric Mfg Co 513 Huff St Dubuque Iowa (7)
Tocco Div Ohio Crankshift Co 3800 Harvard Ave Cleveland 5 Ohio (6)
Trine Mfg Corp 1430 Ferris Pl New York 61 NY (3)
Ulanet (George) Co 413-15 Market St Newark 5 NJ (7)
United Electric Controls Co 85 School St Watertown 72 Mass (7)
Vacuum Tube Products Co Inc 2020 Short St Oceanside Calif (11)
Velotron Inc 1186 Broadway New York 1 NY (7)
Ward Leonard Electric Co 28 South St Mount Vernon NY (8)
Waukesha Motor Co Waukesha Wis (6)
Weksler Instrument Corp 195 E Merrick Rd Freeport LI NY (7)

Weltronic Co 19500 W Eight Mile Rd Detroit 41 Mich (6-11)
Wesix Electric Heater Co 390 First St San Francisco 5 Calif (7)
West Instrument Corp 4363 W Montrose Ave Chicago 41 Ill (7)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1-6-7 thru 13)
White-Rodgers Co 1209 Cass Ave St Louis 6 Mo (7)
Yaruley Electric Corp 40-50 Leonard St New York 13 NY (7)

3K SPECIAL-FUNCTION CONTROLS

1. **Field-discharge switches**
2. **Frequency controls**
3. **Interlocks & electric locks**
4. **Magnetic amplifiers**
5. **Program clock systems**
6. **Saturable reactors**
7. **Servo components**
8. **Solenoids**
9. **Static controls**
10. **Electric brakes & clutches**
11. **Valves (electrically operated)**
12. **Carrier system controls**
13. **Machine & process controls**
14. **Permanent magnets**
15. **Peak load controls**
16. **Electromagnets**
17. **Central industrial control systems**
18. **Flame safeguard equipment**

Devices intended to accomplish specialized control functions.

Acme Electric Corp 45 Water St Cuba NY (6)
Acro Switch Div Robertshaw-Fulton Controls Co 2040 E Main St Columbus 16 Ohio (15)
Allen-Bradley Co 136 W Greenfield Ave Milwaukee 4 Wis (8)
Allis (Louis) Co 427 East Stewart St Milwaukee 1 Wis (2)
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (2-4-6-7-9-11)
American Rectifier Corp 95 Lafayette St NY 13 NY (10)
Atkomatic Valve Co Inc 545 W Abbott St Indianapolis Ind (11)
Auth Electric Co Inc 34-20 45th St LIC 1 NY (5)
Automatic Control Co 995 University Ave St Paul 4 Minn (5-7)
Automatic Devices 714 Hillgrove Ave Western Springs Ill (5)
Automatic Switch Co 50-56 Hanover Rd Florham Pk NJ (1-8-11)
Avlon Div ACF Industries Inc 11 Park Pl Paramus NJ (4-6-7)
B/W Controller Corp 2200 E Maple Rd Birmingham Mich (8)
Barkelew Electric Mfg Co 1905 Columbia Ave Middletown Ohio (1)
Barksdale Valves 5125 Alcoa Ave Los Angeles 58 Calif (11)
Berkshire Transformer Corp Kent Conn (6)
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (4-7)
Brach Mfg Corp 200 Central Ave Newark 3 NJ (4)
Bush Transformer Corp 707 North St Endicott NY (6)
Caltron Products Co 3518 W Pico Blvd Los Angeles 19 Calif (8-11)
Central Transformer Co 900 W Jackson Blvd Chicago 7 Ill (6)
Cincinnati Time Recorder Co 1733 Central Ave Cincinnati 14 Ohio (5)
Clark Controller Co 1146 E 152 St Cleveland 10 Ohio (11-13)
Clark-Cooper Co Inc 317 N Market St Palmyra NJ (11)
Comar Electric Co 3349 W Addison Chicago 18 Ill (8)
Control Switch Div Controls Co of America 4218-30 W Lake St Chicago 24 Ill (3)
Controls Co of America 2450 N 32 St Milwaukee 45 Wisc (8-11)
Crittenden Transformer Works Inc 13011 S Spring St Los Angeles 61 Calif (6)
Crucible Steel Co of America Oliver Bldg Mellon Sq Pittsburgh 22 Pa (14)
Cutler-Hammer Inc 228 N 12th St Milwaukee 1 Wis (3-4-5-8-9-10-11-12-13)
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill (3)
Detroit Controls Div American-Standard 5900 Trumbull Ave Detroit 8 Mich (11)
DeWelt Div American Machine & Foundry Co Fountain Ave Lancaster Pa (10)
Dings Brakes Inc 4740 W Electric Ave Milwaukee 46 Wis (10)
Djeco Div Djordjevic Engineering Co 1933 N Damen Ave Chicago 47 Ill (4-6-9)
Dormeyer Industries 3418 Milwaukee Ave Chicago 41 Ill (6-8)
Dossert Mfg Corp 249-255 Huron St Brooklyn 22 NY (3)
Ederer Engineering Co 2943 1st Ave S Seattle 4 Wash (10)
Edwards Co Inc Norwalk Conn (5)
Electran Mfg Co 1901 Clybourn Ave Chicago 14 Ill (6)
Electric Regulator Corp Norwalk Conn (2-9)
Electrical Windings Inc 2015 N Kolmar Ave Chicago 39 Ill (6)
Electro Engineering Works 401 Preda St San Leandro Calif (6)
Electro-Snap Switch & Mfg Co 4218-30 W Lake St Chicago 24 Ill (3)
Electronics Corp of America One Memorial Dr Cambridge Mass (3)
Federal Sign & Signal Corp 13626 S Western Ave Blue Island Ill (5)
Femco Inc Irwin Pa (13)
Fischer & Porter Co 335 Warminster Rd Hatboro Pa (11)
Gemco Electric Co 25685 W Eight Mile Rd Detroit 40 Mich (4-6-7)
General Controls Co 801 Allen Ave Glendale Calif (8-11)
General Electric Co Apparatus Sales Div Schenectady 5 NY (6)
General Hardware Mfg Co Inc 80 White St New York 13 NY (14)
Guardian Electric Mfg Co 1621 W Walnut St Chicago 12 Ill (8-11)
Hankscraft Co Control Div Reedsburg Wis (15)
Harnischfeger Corp 4400 W National Ave Milwaukee 46 Wis (10)
Hays Mfg Co Automatic Controls Div 12th and Liberty Sts Erie 6 Pa (3-8-11)
Hewson Co Inc 115 Maple St Summit NJ (9)
IMC Magnetics Corp 570 Main St Westbury NY (7)
I-T-E Circuit Breaker Co Greensburg Div P O Box 98 Greensburg Pa (3)
International Business Machines Corp Times Equipment Div 590 Madison Ave New York 22 NY (5-12)
International Register Co 2620 W Washington Blvd Chicago 12 Ill (5)
Leeds & Northrup Co 4970 Stenton Ave Phila 44 Pa (2-6)
Leland (G H) Inc 123 Webster St Dayton 2 Ohio (8)
Lindberg Engineering Co 2450 W Hubbard St Chicago 12 Ill (6)
Lumen Inc Moen Ave (P O Box 905) Joliet Ill (4)
Magnatrol Valve Corp 67 Fifth Ave Hawthorne NJ (11)
Magnetics Inc Control Div Box 391 Butler Pa (4-6-9)
Manning Maxwell & Moore Inc 250 E Main St Stratford Conn (11)
Max-A-Loc Inc El Monte Calif (3)
Mercoid Corp 4201 W Belmont Ave Chicago 41 Ill (11)
Minneapolis-Honeywell Regulator Co 2753 Fourth Ave S Minneapolis 8 Minn (5)
Minneapolis-Honeywell Regulator Co Industrial Div Wayne & Windrim Aves Phila 44 Pa (2-7-11-13-17-18)
Monitor Controller Co 99 Grove St Rockland Mass (8)
National Acme Co Electrical Controls Div 170 E 131 St Cleveland 8 Ohio (8)
National Time & Signal Corp 21800 Wyoming Ave Detroit 37 Mich (5)
Naybor (E V) Laboratories Inc 26 Manorhaven Blvd Port Washington NY (8)
Nothelfer Winding Labs Inc 5 Albemarle Ave (P O Box 455) Trenton 3 NJ (6)
Panellit Div Information Systems Inc 7401 N Hamlin Ave Skokie Ill (17)
Protection Controls Inc 6000 N Legett Ave Chicago 46 Ill (13)
R & IE Equipment Div I-T-E Circuit Breaker Co Greensburg Pa (3)
Raytheon Mfg Co Commercial Apparatus & Systems Div 100 River St Waltham 54 Mass (4)
Refrigerating Specialties Co 3004 W Lexington St Chicago 12 Ill (11)
Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland 17 Ohio (4-7)
Reuland Electric Co 3001 W Mission Rd Alhambra Calif (10)
Richardson-Allen Corp 116-15 Fifteenth Ave College Point LI NY (6)
Ruggles-Klingemann Mfg Co Foster Court Salem Mass (11)
Russell & Stoll Co Inc 125 Barclay St NY 7 NY (3)
Shrader (FW) Co 11623 S Broadway Los Angeles 61 Calif (14-16)
Simplex Time Recorder Co 24 S Lincoln St Gardner Mass (5)
Skinner Chuck Co Skinner Electric Valve Div 95 Edgewood Ave New Britain Conn (11)
●**SORGEL ELECTRIC CO 8388 W National Ave Milwaukee 4 Wis (6)—ADV PG 128**
Southwestern Industrial Electronics Co 10201 Westheimer (P O Box 22187) Houston 27 Tex (4-6)
Sperti Faraday Inc 1322 E Church St Adrian Mich (5)
Square D Co 6060 Rivard St Detroit 11 Mich (11)
Stackpole Carbon Co Stackpole St St Marys Pa (14)
Standard Electric Time Co 89 Logan St Springfield 2 Mass (5)
Stearns Electric Corp 120 N Broadway Milwaukee 2 Wis (10)
Stonite Coil Corp US Hwy 130 Yardville NJ (8)
Stromberg Time Corp 135 S Main St Thomaston Conn (5)
Superior Electric Co 83 Laurel St Bristol Conn (4)
Superior Interlock Corp 73-39 Central Ave Glendale 27 NY (3)
Supreme Electric Products Co 194 Vassar St Rochester 7 NY (11)
Taylor-Winfield Corp 1052 Mahoning Ave NW Warren Ohio (11)
Trio Laboratories Inc Expressway Industrial Park Plainview NY (3)
●**TROMBETTA SOLENOID CORP 329 N Milwaukee St Milwaukee 2 Wis (8)—ADV PG 138-140**
Turbo Machine Co Lansdale Pa (13)
United States Electronics Corp 275 Warren St Lyndhurst NJ (8)
U S Relay-Electronics 717 N Coney Ave Azusa Calif (8)
United Transformer Co 150 Varick St New York 13 NY (6)
Versabar Corp 14 Whyte St Jersey City NJ (10)
Vickers Inc Electric Products Div 1847 Locust St St Louis 3 Mo (4-10)
Viking Instruments Inc East Haddam Conn (11)
Werner Electric Brake & Clutch Co Beloit Wisc (10)
Weltronic Co 19500 W Eight Mile Rd Detroit 41 Mich (2-3)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1-2-3-4-6-7-8-9-10-11-12-13-14-16-17)
White-Rodgers Co 1209 Cass Ave St Louis 6 Mo (11)
Wisconsin Electrical Mfg Co Inc 1237 S Third St Milwaukee 4 Wis (13)
●**ZENITH ELECTRIC CO 155 W Walton St Chicago 10 Ill (5)—ADV PG 135**

3L. LOW-VOLTAGE CONTROL SYSTEMS

Low-voltage relays, switches and power sources for control of lighting and appliance loads from multiple locations.

Bryant Electric Co 1421 State St (Box D Barnum Sta) Bridgeport 2 Conn
General Electric Co Wiring Device Dept 95 Hathaway St Providence RI
Pyramid Instrument Corp Remcon Div 630 Merrick Rd Lynbrook NY
Square D Co 6060 Rivard St Detroit 11 Mich
Touch-Plate Mfg Corp Box 1970 Long Beach Calif
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa

3M. MOTOR CONTROLS

1. **Disconnect switches**
2. **Drum switches & controllers**
3. **Magnetic contactors**
4. **Magnetic starters**
5. **Manual starters**
6. **Pushbutton stations**
7. **Sped regulators & controls**
8. **Motor control centers**

Starting, stopping and control equipment for motor circuits.

Acme Electric Corp 45 Water St Cuba NY (7)
Adam (Frank) Electric Co 3647 Windsor Pl St Louis Mo (1)
Allen-Bradley Co 136 W Greenfield Ave Milwaukee 4 Wis (1 thru 7)
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (2-3-4-5-6-7)
American Electric Switch Div Clark Controller Co 1146 E 152 St Cleveland 10 Ohio (1)
American Rectifier Corp 95 Lafayette St NY 13 NY (7)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 Ill (1-3)
Arrow-Hart & Hegeman Electric Co 103 Hawthorn St Hartford 6 Conn (1-2-3-4-5-6)
Automatic Switch Co 50-56 Hanover Rd Florham Pk NJ (3)
B/W Controller Corp 2200 E Maple Rd Birmingham Mich (3-4)
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (7)
Bryant Electric Co 1421 State St (Box D Barnum Sta) Bridgeport 2 Conn (5)
BullDog Electric Products Div I-T-E Circuit Breaker Co 7610 Joseph Campau Detroit Mich (1)
Clark Controller Co 1146 E 152 St Cleveland 10 Ohio (2-3-4-5-6-7)
Continental Electric Equipment Co Box 1055 Cincinnati 1 Ohio (8)
Crouse-Hinds Co Syracuse 1 NY (3-4-5-6)
Curtis Development & Mfg Co 3244 N 33 St Milwaukee 16 Wis (7)
Cutler-Hammer Inc 228 N 12th St Milwaukee 1 Wis (1-2-3-4-5-6-7-8)
Delco Products Div General Motors Corp 329 E 1st St Dayton 1 Ohio (4)
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill (1)
Electric Controller & Mfg Co 4493 Lee Rd Cleveland 28 Ohio (3-4)
Electric Distribution Products Inc 2200 31st St SW Allentown Pa (8)
Electric Machinery Mfg Co 800 Central Ave Minneapolis 13 Minn (4-7)
Electric Regulator Corp Norwalk Conn (7)
Eliza Metal Products Co Box 408 Bridgeville Pa (6)
Euclid Electric & Mfg Co 50 Edwards St Madison Ohio (2-3-4-6)
Federal Pacific Electric Co 50 Paris St Newark 5 NJ (2-3-4-5-6)
●**FURNAS ELECTRIC CO 1067 McKee St Batavia Ill (2-3-4-5-6)—ADV PG 132**
Gemco Electric Co 25685 W Eight Mile Rd Detroit 40 Mich (4-6-7)

General Controls Co 801 Allen Ave Glendale Calif (3-4)
General Electric Co Apparatus Sales Div Schenectady 5 NY (1 thru 7)
General Electric Co Circuit Protective Devices Dept 41 Woodford Ave Plainville Conn (8)
General Electric Co Distribution Assemblies Dept 41 Woodford Ave Plainville Conn (1 thru 8)
General Switch Co 45 Roebling St Brooklyn 11 NY (1)
●GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (1 thru 7)—ADV PG 2
I-T-E Circuit Breaker Co 1900 Hamilton St Philadelphia 30 Pa (1)
Ideal Electric and Mfg Co East First St Mansfield Ohio (2-4-5)
Killark Electric Mfg Co 3940 Easton Ave St Louis 13 Mo (1-3-4-5-6)
Kirkwood Commutator Corp 4855 W 130 St Cleveland 35 Ohio (5)
Kolton Electric Mfg Co 123 New Jersey Railroad Ave Newark 5 NJ (1)
Lindell Electric Control Corp 384 Canal St New York 13 NY (2)
Link-Belt Co Prudential Plaza Chicago 1 Ill (7)
Lumenite Electronic Corp 407 S Dearborn St Chicago 5 Ill (3)
Machinery Electrification Inc 56 Hudson St Northboro Mass (7)
Minneapolis-Honeywell Regulator Co 2753 Fourth Ave S Minneapolis 8 Minn (6)
Monitor Controller Co 99 Grove St Rockland Mass (1-3-4-5-6)
Murray Mfg Corp 1250 Atlantic Ave Brooklyn 16 NY (1)
National Acme Co Electrical Controls Div 170 E 131st St Cleveland 8 Ohio (5-6)
Nelson Electric Mfg Co P O Box 5385 Tulsa Okla (3-4-6-8)
Opad Electric Co 43 Walker St New York 13 NY (7)
Palmer Electric & Mfg Co 24 Water St Wakefield Mass (1)
Pyle-National Co 1344 N Kostner Ave Chicago 51 Ill (1-4-6)
R-B-M Controls Div Essex Wire Corp 131 Godfrey St Logansport Ind (3-4)
Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland 17 Ohio (7)
Richards-Wilcox Mfg Co 150 Third St Aurora Ill (6)
Russell & Stoll Co Inc 125 Barclay St NY 7 NY (1-4-5-6)
Servospeed Div Electro Devices Inc 4 Godwin Ave Paterson NJ (7)
Square D Co 6060 Rivard St Detroit 11 Mich (1 thru 7)
Struthers-Dunn Inc Pitman NJ (4)
Superior Electric Co 83 Laurel St Bristol Conn (7)
System Analyzer Corp 700 W State St Nokomis Ill (3)
Tulsa Winch Div Vickers Inc 815 E First St Tulsa 20 Okla (7)
U S Electrical Motors Inc 200 E Slauson Ave Los Angeles 54 Calif (7)
Vickers Inc Electric Products Div 1847 Locust St St Louis 3 Mo (7)
Wac Line Inc 35 S St Clair St Dayton 2 Ohio (7)
●WADSWORTH ELECTRIC MFG CO INC 20-34 W 11th St (Box 272) Covington Ky (1)—ADV PG 140-141-143
●WAGNER ELECTRIC CORP 6400 Plymouth Ave St Louis 33 Mo (4)—ADV PG 42-141
Ward Leonard Electric Co 28 South St Mount Vernon NY (3-4-6-7)
Waltronic Co 19500 W Eight Mile Rd Detroit 41 Mich (7)
●WESTINGHOUSE ELECTRIC CORP P O Box 868 Pittsburgh 30 Pa (8)—ADV PG 4-69-70-71-72
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1 thru 7)—ADV PG 2nd COVER
Winterburn Mfg Co P O Box 386 Putnam Conn (7)
●ZENITH ELECTRIC CO 155 W Walton St Chicago 10 Ill (3-4)—ADV PG 135
Zinsco Electrical Products 729 Turner Los Angeles 12 Calif (8)

3N. RELAYS

1. General purpose
2. Protective
3. Timing & time delay
4. Rotary

General purpose relays include magnetic and mechanically held types for remote switching of electrical circuits. Protective relays include overload, thermal, undervoltage, phase rotation, etc., relays.

A G A Div Elastic Stop Nut Corp of America 1027 Newark Ave Elizabeth NJ (3)
Abrams Instrument Corp 606 E Shiawasee St Lansing Mich (3)
Acro Switch Div Robertshaw-Fulton Controls Co 2040 E Main St Columbus 16 Ohio (1)
Aemco Inc 10 State St Mankato Minn (1)
Airserco Mfg Co Inc 435 Melwood St Pittsburgh 13 Pa (1)
Allen-Bradley Co 136 W Greenfield Ave Milwaukee 4 Wis (1-2-3)
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (1-2-3)
Amperite Co Inc 561 Broadway NY 12 NY (3)
Arrow-Hart & Hegeman Electric Co 103 Hawthorn St Hartford 6 Conn (1)
Autocall Co 58 Warden Ave Shelby Ohio (1)
Automatic Electric Co Northlake Ill (1-3)
Automatic Switch Co 50-56 Hanover Rd Florham Pk NJ (1-2-3)
B/W Controller Corp 2200 E Maple Rd Birmingham Mich (2)
Baker Perkins Inc Saginaw Mich (2)
Bristol Motor Div Vocaline Co of America Inc Coulter St Old Saybrook Conn (3)
Clare (C P) & Co 3101 Pratt Blvd Chicago 45 Ill (1)
Clark Controller Co 1146 E 152 St Cleveland 10 Ohio (1-2-3)
Comar Electric Co 3349 W Addison Chicago 18 Ill (1)
Cramer Controls Corp Main St Centerbrook Conn (3)
Cutler-Hammer Inc 228 N 12th St Milwaukee 1 Wis (1-2-3)
Daystrom Inc Weston Instruments Div 614 Frelinghuysen Ave Newark 12 NJ (1)
Ebert Electronics Corp 212-26 Jamaica Ave Queens Village 28 LI NY (1)
Elgin National Watch Co Electronics Div 2435 N Naomi St Burbank Calif (1-4)
Euclid Electric & Mfg Co 50 Edwards St Madison Ohio (1-3)
Farmer Electric Products Co Inc 2300 Washington St Newton Lower Falls 62 Mass (1)
Federal Pacific Electric Co 50 Paris St Newark 5 NJ (2)
General Controls Co 801 Allen Ave Glendale Calif (1)
General Electric Co Apparatus Sales Div Schenectady 5 NY (1-2-3)
Guardian Electric Mfg Co 1621 W Walnut St Chicago 12 Ill (1)
H-B Instrument Co American & Bristol Sts Philadelphia 40 Pa (1)
Haledy Electronics Co 57 William St NY 5 NY (1)
Hankscraft Co Control Div Reedsburg Wis (1)
Haydon (A W) Co 232 N Elm St Waterbury Conn (3)
Haydon Div General Time Corp 245 E Elm St Torrington Conn (3)
Heinemann Electric Co Pennsylvania Ave & Plum St Trenton 2 NJ (2-3)
Iron Fireman Mfg Co Electronics Div 2838 S E 9th Ave Portland 2 Ore (1)
Jordan Electronics 3025 W Mission Rd Alhambra Calif (3)
Kurman Electric Co 191-193 Newel St Brooklyn 22 NY (1-2-3)
●LEACH CORP 5915 Avalon Blvd Los Angeles 3 Calif (1-3)—ADV PG 124
Leland (G H) Inc 123 Webster St Dayton 2 Ohio (4)
Lewus Electric Co 1254 W Harrison St Chicago 7 Ill (1)
Line Electric Co 229 River St Orange NJ (3)
Lumenite Electronic Corp 407 S Dearborn St Chicago 5 Ill (3)
Machinery Electrification Inc 56 Hudson St Northboro Mass (2-3)
Mercoid Corp 4201 W Belmont Ave Chicago 41 Ill (1)
Minneapolis-Honeywell Regulator Co 2753 Fourth Ave S Minneapolis 8 Minn (1-3)
Naybor (E V) Laboratories Inc 26 Manorhaven Blvd Port Washington NY (1-3)
Nelson Electric Mfg Co P O Box 5385 Tulsa Okla (3)
Ohmite Mfg Co 3601 Howard St Skokie Ill (1-2)
Palmer Electric & Mfg Co 24 Water St Wakefield Mass (1)
Partrick & Wilkins Co 51 N Seventh St Phila 6 Pa (1)
Penn Controls Inc Goshen Ind (1)
Phillips Control Corp 59 W Washington St Joliet Ill (1)
Pollak (Joseph) Corp 81-95 Freeport St Boston 22 Mass (1)
Potter & Brumfield Div American Machine and Foundry Co Princeton Ind (1)
Price Electric Corp East Church & Second Sts Frederick Md (1)
R-B-M Controls Div Essex Wire Corp 131 Godfrey St Logansport Ind (1)
Rhodes (M H) Inc 30 Bartholomew Ave Hartford 6 Conn (3)
Square D Co 6060 Rivard St Detroit 11 Mich (1-2-3)
Standard Electrical Products Co 2240 E Third St Dayton 3 Ohio (1-2-3)
Stradley Engineering Co P O Box 6006 Pittsburgh 11 Pa (2)
Struthers-Dunn Inc Pitman NJ (1-3)
Sylvania Electric Products Inc 1740 Broadway NY 19 NY (3)
Taitco Div Tait Mfg Co 500 Webster St Dayton 1 Ohio (1)
Terado Co 1068 Raymond Ave St Paul 14 Minn (1)
Touch-Plate Mfg Corp Box 1970 Long Beach Calif (1)
Ulanet (George) Co 413-15 Market St Newark 5 NJ (3)
U S Relay-Electronics 717 N Coney Ave Azusa Calif (1-2-3)
Ward Leonard Electric Co 28 South St Mount Vernon NY (1)
Webster Electric Co 1900 Clark St Racine Wisc (3)
Wesix Electric Heater Co 390 First St San Francisco 5 Calif (1)

3P. SYSTEM REGULATING EQUIPMENT

1. Capacitors
2. Rheostats
3. Voltage regulators
4. Load resistors
5. Varistors
6. Thermistors

Capacitors are for power factor control; resistances & rheostats are for control of voltage & current in circuits to motors, elevators, plating equipment, etc.; voltage regulators control voltage of transmission lines, feeders or specific utilization equipment. Varistors are voltage-sensitive resistors; thermistors are thermally sensitive resistors.

Acme Electric Corp 45 Water St Cuba NY (3)
Allen-Bradley Co 136 W Greenfield Ave Milwaukee 4 Wis (2)
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (3)
American Rectifier Corp 95 Lafayette St New York 13 NY (3)
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (3)
Central Transformer Co 900 W Jackson Blvd Chicago 7 Ill (3)
Columbia Electric Mfg Co 4519 Hamilton Ave Cleveland 14 Ohio (2)
Continental Carbon Div of Wirt Co 5221 Greene St Philadelphia 44 Pa (2)
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill (3)
Djeco Div Djordjevic Engineering Co 1933 N Damen Ave Chicago 47 Ill (3)
Electronic Measurements Co Inc Lewis St & Maple Ave Eatontown NJ (3)
Everett (E A) Inc 3[illegible]5 56th St Woodside 77 NY (2)
Exmet Corp 127 Marbledale Rd (P O Box 485) Tuckahoe NY (4)
General Electric Co Apparatus Sales Div Schenectady 5 NY (1-2-3-6)
Girard-Hopkins 1000 40th Ave Oakland 1 Calif (1)
Globar Plant (Refractories Div) Carborundum Co Niagara Falls NY (4-5-6)
Guyan Machinery Co Inc Box 150 Logan W Va (2-4)
Keystone Carbon Co Inc 1935 State St St Marys Pa (6)
Lake Shore Electric Corp 205 Willis St Bedford Ohio (3)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (1-3)
Mallory (P R) & Co Inc 30 S Gray St Indianapolis 6 Ind (2)
National Electric Controller Co 7070 Glenwood Ave Chicago 26 Ill (2)
Ohio Brass Co 380 N Main St Mansfield Ohio (1)
Ohmite Mfg Co 3601 Howard St Skokie Ill (2)
Pennsylvania Transformer Div McGraw-Edison Co Box 330 Canonsburg Pa (3)
Raytheon Mfg Co Commercial Apparatus & Systems Div 100 River St Waltham 54 Mass (3)
Sangamo Electric Co 11th & Converse Springfield Ill (1)
Shallcross Mfg Co Preston St Selma NC (4)
Simplex Co Inc 1139-41 N MacArthur Blvd Springfield Ill (3)
Sorensen & Co Inc Richards Ave South Norwalk Conn (3)
Sprague Electric Co North Adams Mass (1)
Stackpole Carbon Co Stackpole St St Marys Pa (4)
Superior Electric Co 83 Laurel St Bristol Conn (2-3)
Tobe Deutschmann Corp Providence Highway Norwood Mass (1)
Ward Leonard Electric Co 28 South St Mount Vernon NY (2-4)
Weltronic Co 19500 W Eight Mile Rd Detroit 41 Mich (3)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1-3)
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1-2-3)—ADV PG 2nd COVER

TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers* on the Free Information cards elsewhere in this issue.

*Code No.	Description, Pages Catalog No. & Mfr.
3-1	Voltage Regulators; Cat. No. 21B7977E (Allis-Chalmers)
3-2	Motor Control Centers; 15p; Cat. No. SPM-1-1159 (Automatic Control)
3-3	Motor Control Centers; Cat. No. SPM-1-1159 (Automatic Control)
3-4	Electromagnetic Controls; Cat. No. 57-SAK (Automatic Switch)

3-5 Valve Design Handbook; 40p; Cat. No. 9-PS (Barksdale)

3-6 Valves; 19p; Cat. No. 59-60 (Barksdale)

3-7 Valves; 80p; Cat. No. 110959 (Barksdale)

3-8 Safety Indicators; Cat. No. RG-21 (Bin-Dicator)

3-9 Controls; 14p; Cat. No. 6200 (Clark)

3-10 Motor Control Centers; 16p; Cat. No. PL6200 (Clark)

3-11 Safety Switches; Cat. No. PL-250ND (Clark)

3-12 Traffic Controllers; Cat. No. 2720 (Crouse-Hinds)

3-13 Combination Starters; 8p; Cat. No. ED-30 (Cutler-Hammer)

3-14 Control Panels; 11p; Cat. No. EN-185 (Cutler-Hammer)

3-15 Limit Switches; 11p; Cat. No. 10316-L (Cutler-Hammer)

3-16 Modular Regulators; 27p (Cutler-Hammer)

3-17 Voltage Controls; 15p; Cat. No. EN-162 (Cutler-Hammer)

3-18 Limit Switches; 8p; Cat. No. 956 (Denison)

3-19 Controls; 3p (Dixie Controller)

3-20 Tab-Weld Resistors; 4p; Cat. No. 6715 (Electric Controller & Mfg.)

3-21 Time Cycle Controllers; 14p; Cat. No. 459 (Electric Switch)

3-22 Lighted Pushbutton Panel Switches; Cat. No. 55 (Electrosnap)

3-23 Advance Relays; 68p (Elgin)

3-24 Switchboards; 6p; Cat. No. 2015 (Federal Pacific)

3-25 Electric Motor Controls; 69p; Cat. No. 5900 (Furnas)

3-26 Magnetic Starters; 16p; Cat. No. 14-B1 (Furnas)

3-27 Magnetic Starters; 15p; Cat. No. 14-B1 (Furnas)

3-28 Motor Controls; 72p; Cat. No. 5900 (Furnas)

3-29 Pressure Switches; 9p; Cat. No. 69-B1 (Furnas)

3-30 Push-Button Devices; 23p; Cat. No. 50-B1 (Furnas)

3-31 Adjustable Speed Drives; 16p; Cat. No. GEA-6806 (General Electric)

3-32 Circuit Breakers; 2p; Cat. No. GEA-6759 (General Electric)

3-33 Controls; 72p; Cat. No. GEC-1260D (General Electric)

3-34 Distribution Equipment; 12p; Cat. No. GEA-6981 (General Electric)

3-35 Load Control Systems; 4p; Cat. No. GET-2916 (General Electric)

3-36 Motor Control Centers; 20p; Cat. No. GEA-6367B (General Electric)

3-37 Power Capacitors; 12p; Cat. No. GEA-6990 (General Electric)

3-38 Process Timers; 4p; Cat. No. GEZ-2985 (General Electric)

3-39 Switches; 48p; Cat. No. 6002 (General Switch)

3-40 Pushbutton Enclosures; 4p; Cat. No. 136 (Hoffman)

3-41 Electromagnetic Clutches; 20p; Cat. No. R-6304-1B (I-T-E)

3-42 Switchgear; 21p; Cat. No. 2804-1A (I-T-E)

3-43 Unit Substations; 4p; Cat. No. S-2701-1A (I-T-E)

3-44 Time Controls; 7p; Cat. No. TS-89 (International Register)

3-45 Panelboards, Switchboards & Unit Substations; 52p (Kinney)

3-46 Automatic Transfer Switches; 4p; Cat. No. 07500-G (Lake Shore)

3-47 Electrical Switches; 31p; Cat. No. 5208A (Licon)

3-48 Mechanical Adjustable-Speed Drive; 6p; Cat. No. 3600 (Louis Allis)

3-49 Power Control Units; 8p; Cat. No. S-10/9 (Magnetic Amplifiers)

3-50 Basic Switches; 20p; Cat. No. 63 (Micro Switch)

3-51 Toggle Switches & Assemblies; 32p; Cat. No. 73d (Micro Switch)

3-52 Unit Substations; 44p; Cat. No. PSG-559 (Pennsylvania Transformer)

3-53 Electric Eye Reference Manual; 16p; Cat. No. 571 (Photomation)

3-54 Pole Top Switches; 11p; Cat. Sec. 1 (Powerdyne)

3-55 Electric Heat Control; Cat. No. P-80 (Powers)

3-56 Low-Voltage Switching; Cat. No. RM-610 (Pyramid)

3-57 Adjustable Speed Drives; 12p; Cat. No. D-2507 (Reliance)

3-58 Variable-Speed Motodrives; 96p; Cat. No. M-592 (Reliance)

3-59 Limit Switches; 43p; Cat. No. A-6-a (Ringsdorff)

3-60 Voltage Regulators; Cat. No. AC610 (Sorenson)

3-61 Capacitors; 8p; Cat. No. PF-1200 (Sprague)

3-62 Light Control Equipment; 26p; Cat. No. L157P-1 (Superior)

3-63 Voltage Regulators; 8p; Cat. No. S2591ET (Superior)

3-64 Solenoid Brakes; 16p; Cat. No. EE220 (Trombetta)

3-65 Controlled Speed Systems; 7p; Cat. No. F-1952 (U.S. Electrical)

3-66 Magnetic Clutch; Cat. No. EPD-6126-3 (Vickers)

3-67 Safety Starters; Cat. No. B-7322 (Westinghouse)

SECTION 4. PROTECTIVE DEVICES

4A. FUSE CUTOUTS & LINKS

For high-voltage distribution lines.

Chance (A B) Co 210 North Allen St Centralia Mo

●G & W ELECTRIC SPECIALTY CO 3500 W 127 St Blue Island Ill—ADV PG 110

General Electric Co Apparatus Sales Div Schenectady 5 NY

Hubbard & Co 6301 Butler St Pittsburgh 1 Pa

Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 Ill

Kearney (James R) Corp 4236 Clayton Ave St Louis 10 Mo

Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis

S & C Electric Co 4435 Ravenswood Ave Chicago 40 Ill

USCO Power Equipment Corp 829 N 36th Way Birmingham 4 Ala

Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa

4B. FUSES

1. **Cartridge**
2. **Current-limiting**
3. **Glass tube**
4. **Open link**
5. **Plug**

Cartridge, plug and open-link fuses are for feeder and branch circuit distribution overload protection; glass tube fuses protect individual devices or instruments; current-limiting fuses limit system short-circuit currents to safe values.

Bussmann Mfg Div McGraw-Edison Co University at Jefferson St Louis 7 Mo (1-2-3-4-5)

Cable Electric Products Inc 234 Deboll St Providence 7 RI (1-5)

Chase-Shawmut Co 374 Merrimac St Newburyport Mass (1-2-5)

Commercial Enclosed Fuse Co of N.J. 6812 Polk St Guttenberg NJ (1-3-5)

Dependable-Electric Mfg Co Inc 537 Johnson Ave Brooklyn 37 NY (5)

Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (1-3-5)

Economy Fuse Div Federal Pacific Electric Co 2717 N Greenview Ave Chicago 14 Ill (1-5)

Excel Fuse Co 117 W Erie St Pittsburgh 12 Pa (1)

Federal Pacific Electric Co 50 Paris St Newark 5 NJ (1-5)

Gem Electric Mfg Co Inc 237 37th St Brooklyn NY (2-5)

General Electric Co Wiring Device Dept 95 Hathaway St Providence RI (5)

●GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (1-3-4-5)—ADV PG 2

Interlectric Corp 1401 Lexington Ave Warren Pa (1)

Littlefuse Inc 1865 Miner St Des Plaines Ill (3)

Monarch Electric Corp 118 E First St Jamestown NY (1-5)

Pierce Renewable Fuses Inc Box F Leicester NY (1-5)

Royal Electric Corp 95 Grand Ave Pawtucket RI (1-5)

S & C Electric Co 4435 Ravenswood Ave Chicago 40 Ill (2)

Solar Electric Corp 121 Central Ave Warren Pa (1)

Star-A Electric Mfg Co Inc 269 Meserole St Brooklyn 6 NY (1-5)

Trico Fuse Mfg Co 2948 N 5th St Milwaukee 12 Wis (1)

Ware Fuse Corp 4400 W Lake St Chicago 24 Ill (1-5)

Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (2)

4C. FUSE ACCESSORIES

1. **Dummy plugs**
2. **Fuse clips**
3. **Fuse clip clamps**
4. **Fuse clip reducers**
5. **Fuse cutouts, blocks & holders**
6. **Fuse links**
7. **Fuse wire strip**
8. **Fuse adapter remover**
9. **Fuse clip cleaner**

Supplementary equipment for low-voltage distribution fuses.

Atlee Corp 47 Prospect St Woburn Mass (2)

Bussman Mfg Div McGraw-Edison Co University at Jefferson St Louis 7 Mo (1 thru 7)

Cable Electric Products Inc 234 Daboll St Providence 7 RI (5)

Chase-Shawmut Co 374 Merrimac St Newburyport Mass (2-5-6-7)

Circle F Mfg Co 720 Monmouth St Trenton 4 NJ (5)

Commercial Enclosed Fuse Co of NJ 6812 Polk St Guttenberg NJ (1-2-3-4-6-7)

Connecticut Electric Mfg Co Main St Bantam Conn (5)

Dante Electric Mfg Co Bantam Conn (2)

Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (3-4-6)

Excel Fuse Co 117 W Erie St Pittsburgh 12 Pa (2-6)

General Electric Co Apparatus Sales Div Schenectady 5 NY (5-6)

General Electric Co Wiring Device Dept 95 Hathaway St Providence RI (5)

Hoffman Engineering Corp 1050 Tyler St Anoka Minn (5)

Hub Industries Inc 442 Elm St Sycamore Ill (3-4)

Ilsco Corp 4730 Madison Rd Cincinnati 27 Ohio (2)

Interlectric Corp 1401 Lexington Ave Warren Pa (3-6)
Knox Porcelain Corp 2706 Mynders Ave (P O Box 2031) Knoxville 1 Tenn (5)
Kolton Electric Mfg Co 123 New Jersey Railroad Ave Newark 5 NJ (2-4-5)
Kulka Electric Corp 633 S Fulton Ave Mount Vernon NY (2)
Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (3-9)
Monarch Electric Corp 118 E First St Jamestown NY (2-6)
Multi Electric Mfg Inc 4223 W Lake St Chicago 24 Ill (2-5)
Pierce Renewable Fuses Inc Box F Leicester NY (6)
Royal Electric Corp 95 Grand Ave Pawtucket RI (4)
Specialties Inc 2936 Sacramento St Pittsburgh 4 Pa (2)
Square D Co 6060 Rivard St Detroit 11 Mich (2)
Star-A Electric Mfg Co Inc 269 Meserole St Brooklyn 6 NY (6)
Sylvania Electric Products Inc 1740 Broadway NY 19 NY (2)
Trico Fuse Mfg Co 2948 No 5th St Milwaukee 12 Wis (3-4)
Ware Fuse Corp 4400 W Lake St Chicago 24 Ill (6)

4D. CIRCUIT BREAKERS

1. **High voltage**
2. **600v and less**
3. **Explosion-proof**
4. **Vapor-proof**

For primary and secondary distribution feeder and branch circuit protection.

Adam (Frank) Electric Co 3647 Windsor Pl St Louis Mo (2)
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (1-2)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 Ill (2)
BullDog Electric Products Div I-T-E Circuit Breaker Co 7610 Joseph Campau Detroit Mich (2)
●**CROUSE-HINDS CO Syracuse 1 NY (2)—ADV PG 4th COVER**
●**CUTLER-HAMMER INC 228 N 12th St Milwaukee 1 Wis (2)—ADV PG 80-81**
Derrick Light & Equipment Co 1201 E Daggett (P O Box 414) Fort Worth Tex (2-4)
Federal Pacific Electric Co 50 Paris St Newark 5 NJ (1-2)
Gemco Electric Co 25685 W Eight Mile Rd Detroit 40 Mich (3)
General Electric Co Apparatus Sales Div Schenectady 5 NY (1-2)
General Electric Co Circuit Protective Devices Dept 41 Woodford Ave Plainville Conn (2)
Heinemann Electric Co Pennsylvania Ave & Plum St Trenton 2 NJ (2)
Hope Electrical Products Co Inc 27 Long Ave Hillside NJ (2)
I-T-E Circuit Breaker Co 1900 Hamilton St Philadelphia 30 Pa (1-2-3)
●**KILLARK ELECTRIC MFG CO 3940 Easton Ave St Louis 13 Mo (3-4)—ADV PG 86-87**
Kolton Electric Mfg Co 123 New Jersey Railroad Ave Newark 5 NJ (2)
●**LAKE SHORE ELECTRIC CORP 205 Willis St Bedford Ohio (2)—ADV PG 118**
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (1)
Mechanical Products Inc 1824 River St Jackson Mich (2)
Murray Mfg Corp 1250 Atlantic Ave Brooklyn 16 NY (2)
Nelson Electric Mfg Co P O Box 5385 Tulsa Okla (1-2-3)
Pyle-National Co 1344 N Kostner Ave Chicago 51 Ill (2-3)
Russell & Stoll Co Inc 125 Barclay St NY 7 NY (2-3)
Sangamo Electric Co 11th & Converse Springfield Ill (2)
Square D Co 6060 Rivard St Detroit 11 Mich (1-2-3)
●**WADSWORTH ELECTRIC MFG CO INC 20-34 W 11th St (Box 272) Covington Ky (2)—ADV PG 140-141-143**
●**WESTINGHOUSE ELECTRIC CORP P O Box 868 Pittsburgh 30 Pa (1-3)—ADV PG 4-69-70-71-72**
Westinghouse Electric Corp Standard Control Div Beaver Pa (2)
●**WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (2-3)—ADV PG 2nd COVER**
Zinsco Electrical Products 729 Turner Los Angeles 12 Calif (2)

4E SPECIAL PROTECTIVE EQUIPMENT

1. **Cathodic protective equipment**
2. **Current-limiting reactors**
3. **Lightning protective equipment**
4. **Motor thermal overload devices**
5. **Network protectors**
6. **Ground rods**
7. **Ballast thermal**
8. **Motor single-phasing protection**
9. **Capacitor protective gaps**

Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (2-4)
Blackburn (Jasper) Corp 1525 Woodson Rd St Louis 14 Mo (6)
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (2)
Brach Mfg Corp 200 Central Ave Newark 3 NJ (3)
Cathodic Protection Service 4601 Stanford St Houston Tex (1)
Copperweld Steel Co Wire and Cable Div Glassport Pa (3-6)
Cutler-Hammer Inc 228 N 12th St Milwaukee 1 Wis (4)
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill (3)
Djeco Div Djordjevic Engineering Co 1933 N Damen Ave Chicago 47 Ill (1-2)
Engelhard (Charles) Inc 850 Passaic Ave East Newark NJ (1)
General Cable Corp 730 Third Ave New York 17 NY (1)
General Electric Co Apparatus Sales Div Schnectady 5 NY (1 thru 5-9)
Goetz (J F) Mfg Co 162 South St Hartford Wis (3)
Good-All Electric Mfg Co 112 W First St Ogallala Neb (1)
Hubbard & Co 6301 Butler St Pittsburgh 1 Pa (3-6)
Independent Protection Co Inc 1605-07 S Main St Goshen Ind (3)
Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 Ill (3)
Kearney (James R) Corp 4236 Clayton Ave St Louis 10 Mo (3)
Knopp Inc 1307 66th St Oakland 8 Calif (1)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (3)
M & W Electric Mfg Co Inc S Walnut St (P O Box 87) East Palestine Ohio (6)
Metals & Controls Div Texas Instruments Inc 34 Forest St Attleboro Mass (4-7)
Murray Mfg Corp 1250 Atlantic Ave Brooklyn 16 NY (2)
Nelson Electric Mfg Co P O Box 5385 Tulsa Okla (1)
New Jersey Zinco Co 160 Front St New York 38 NY (1-6)
Ohio Brass Co 380 N Main St Mansfield Ohio (3)
Penn-Union Electric Corp 315 State St Erie Pa (6)
Porcelain Products Co 224 N Patterson St Carey Ohio (6)
Premax Products Div Chisholm-Ryder Co Inc College & Highland Aves Niagara Falls NY (6)
R T & E CORP 1900 East North St Waukesha Wis (3)
Rome Cable Div Aluminum Co of America 421 Ridge St Rome NY (1)
Security Mfg & Contracting Co 606-612 Pine St Burlington Wis (3)
Stradley Engineering Co P O Box 6006 Pittsburgh 11 Pa (8)
Weaver (J A) Co 2110 Howard St St Louis 6 Mo (6)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (2-3-4-5-8-9)
●**WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (2-6)—ADV PG 2nd Cover**

TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers* on the Free Information cards elsewhere in this issue.

*Code No.	Description, Pages Catalog No. & Mfr.
4-1	Safetybreakers; 36p (Cutler-Hammer)
4-2	Cartridge Fuses; 12p; Cat. No. 1330 (Economy)
4-3	Circuit Breakers; 20p; Cat. No. GEA-5915E (General Electric)
4-4	Circuit Breakers; Cat. No. GEA-7070 (General Electric)
4-5	Fuse Cutouts; 12p; Cat. No. GEA-6208B (General Electric)
4-6	Molded Case Circuit Breaker Accessories; 12p; Cat. No. GEA-6757 (General Electric)
4-7	Oil-Filled Cutouts; 28p; Cat. No. GEA-6825 (General Electric)
4-8	Thyrite Station Arresters; 12p; Cat. No. GEA-6794A (General Electric)
4-9	Circuit Breakers; 40p; Cat. No. 5001-1A (I-T-E)
4-10	Circuit Breakers; Cat. No. S-4601-1A (I-T-E)
4-11	Circuit Breakers; 7p; Cat. No. 4261-2B (I-T-E)
4-12	Circuit Breakers; 56p; Cat. No. 1960 (I-T-E)
4-13	Fuse Cutouts; Cat. No. FC3 (Line Material)
4-14	Cathodic Protection; 3p; Cat. No. RCR-1111 (Rome)

SECTION 5. WIRING DEVICES AND BOXES

See index for panelboards and other equipment normally housed in cabinets.

Switches other than wiring device switches are listed in Sec. 3.

Hangers and supports for cable and conduit are listed in Sec. 6 & 7, respectively.

Lamp dimmers are listed in Sec. 3.

5A. WIRING DEVICE SWITCHES

1. **Canopy**
2. **Ceiling pull**
3. **Cord**
4. **Delayed action**
5. **Door-operated**
6. **Key-operated**
7. **Lever-operated pull**
8. **Lumiline cap**
9. **Mercury**
10. **Momentary contact**
11. **Oil burner**
12. **Pendant**
13. **Pushbutton**
14. **Rotary**
15. **Tumbler**
16. **Weatherproof**
17. **Toggle**
18. **Tap**
19. **Rocker type**
20. **Silent type**

Small switches used for general control of lighting and appliance loads in residences, offices, etc.

Arrow-Hart & Hegeman Electric Co 103 Hawthorne St Hartford 6 Conn (1-2-3-6-10-12-13-14-15-16)
Bryant Electric Co 1421 State St (Box D Barnum Sta) Bridgeport 2 Conn (1-2-3-5-8-9-10-12-13-14-15-16)
Cable Electric Products Inc 234 Daboll St Providence 7 RI (3-12-14-15-17)
●**CIRCLE F MFG CO 720 Monmouth St Trenton 4 NJ (1-2-3-5-8-10-11-12-13-14-15-16)—ADV PG 101**
Cutler-Hammer Inc 228 N 12th St Milwaukee 1 Wis (1-5-6-7-10-11-12-13-14-16)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (1-2-5-12-15-16-20)
Edco International Corp 20722 W Seven Mile Rd Detroit 19 Mich (4)
Edwards Co Inc Norwalk Conn (13)
Electro-Snap Switch & Mfg Co 4218-30 W Lake St Chicago 24 Ill (13)
Furnas Electric Co 1067 McKee St Batavia Ill (13)
Gem Electric Mfg Co Inc 237 37th St Brooklyn NY (16)

General Electric Co Wiring Device Dept 95 Hathaway St Providence RI (1-3-5-8-9-11-13-14-15-16)
Guardian Electric Mfg Co 1621 W Walnut St Chicago 12 Ill (13)
H-B Instrument Co American & Bristol Sts Philadelphia 40 Pa (9)
Hart Mfg Co 164 Bartholomew Ave Hartford Conn (14-15)
Hubbell (Harvey) Inc State St & Bostwick Ave Bridgeport 2 Conn (2-3-5-6-8-9-11-12-13-14-15-16)
Killark Electric Mfg Co 3940 Easton Ave St Louis 13 Mo (7-10-12-13-15-16)
Kulka Electric Corp 633 S Fulton Ave Mount Vernon NY (1-3-10)
Lee Electric Inc 566 52nd St West New York NJ (13)
Leviton Mfg Co Inc 236 Greenpoint Ave Brooklyn 22 NY (1-2-3-8-9-10 thru 16-18)
Massey (A H) Inc 111 3rd St (P O Box 206) Derby Conn (15)
McGill Mfg Co Inc Valparaiso Ind (1-7-10-13-17-19)
Micro Switch Div of Minneapolis-Honeywell Regulator Co Chicago & Spring Freeport Ill (12)
Minneapolis-Honeywell Regulator Co 2753 Fourth Ave S Minneapolis 8 Minn (11-13)
Pass & Seymour Inc Syracuse 9 NY (2-3-5-6-9-10-12-13-15-16)
Pyramid Instrument Corp 630 Merrick Rd Lynbrook NY (10)
Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa (9-13-15)
Royal Electric Corp 95 Grand Ave Pawtucket RI (1-16)
Russell & Stoll Co Inc 125 Barclay St NY 7 NY (15-16)
●**SIERRA ELECTRIC CORP 15100 S Figueroa Gardena Calif (9-13-15-17-20)—ADV PG 117**
Slater Electric & Mfg Co Inc 45 Sea Cliff Ave Glen Cove NY (2-5-6-9-10-11-13-15-16)
Suttle Equipment Co 135 S LaSalle St Chicago 3 Ill (13)
Theiler (H J) Corp Ashmont Ave Whitinsville Mass (15)
Touch-Plate Mfg Corp Box 1970 Long Beach Calif (10)
Trine Mfg Corp 1430 Ferris Place New York 61 NY (5)
Wadsworth Electric Mfg Co Inc 20-34 W 11th St (Box 272) Covington Ky (5-16)
Winterburn Mfg Co P O Box 386 Putnam Conn (5)

5B. CORD CONNECTION DEVICES

1. Caps, plugs, bases & taps, household type
2. Convenience outlets
3. Multi-outlet assemblies
4. Power cord-connection bodies, heavy duty
5. Range & dryer receptacles
6. Weatherproof outlets
7. Grounding adapters
8. TV antenna outlets
9. Combination TV-ac outlets
10. Fused plugs & taps
11. Explosion-proof plugs & receptacles
12. Locking-type plugs & receptacles

Devices for extension of electrical circuits to equipment by means of portable cords.

Adam (Frank) Electric Co 3647 Windsor Pl St Louis Mo (2)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 Ill (1-2-4-6)
Arrow-Hart & Hegeman Electric Co 103 Hawthorn St Hartford 6 Conn (1 thru 7)
B & M Electric Corp 168 7th St Brooklyn 15 NY (10)
Beckley Electric Co Inc 468-470 Grand Ave Brooklyn 38 NY (1-4)
●**BELL ELECTRIC CO 5735 S Claremont Ave Chicago 36 Ill (2-4-5-6)—ADV PG 108-112-118**
Black (M) Mfg Co 300-08-N Third St Phila 6 Pa (1)
Bryant Electric Co 1421 State St (Box D Barnum Sta) Bridgeport 2 Conn (1-2-3-4-5-6)
BullDog Electric Products Div I-T-E Circuit Breaker Co 7610 Joseph Campau Detroit Mich (3)
CBC Electronics Co Inc 2601 N Howard St Philadelphia 33 Pa (3)
Cable Electric Products Inc 234 Daboll St Providence 7 RI (1-2-3)
Cam-Lok Div Empire Products Inc 9201 Blue Ash Rd (Box 98) Cincinnati 36 Ohio (4-6-11)
Cannon Electric Co 3208 Humboldt St Los Angeles 31 Calif (4)
●**CIRCLE F MFG CO 720 Monmouth St Trenton 4 NJ (1 thru 7)—ADV PG 101**
●**CROUSE-HINDS CO Syracuse 1 NY (1-2-3-4-6)—ADV PG 4th COVER**
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill (4)
Derrick Light & Equipment Co 1201 E Daggett (P O Box 414) Fort Worth Tex (6)
Duro-Test Corp 2321 Hudson Blvd North Bergen NJ (1)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (1-2-4-5-6-7)
Ericson Mfg Co 1660 Hayden Ave Cleveland 12 Ohio (3-4)
Gem Electric Mfg Co Inc 237 37th St Brooklyn NY (1-2-3-4-5-6)
General Electric Co Wiring Device Dept 95 Hathaway St Providence RI (1-2-4-5-6-7)
Glade Mfg Co 1632 W 75 Pl Chicago 20 Ill (1)
●**GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (1 thru 6)—ADV PG 2**
Hessel (W F) Co Inc 74 Beekman St NY 38 NY (3-4-6-10)
●**HOFFMAN ENGINEERING CORP 1050 Tyler St Anoka Minn (3-6)—ADV PG 122-134**
Hopax Electric Inc 547 Greenwich St NY 13 NY (1)
●**HUBBELL (HARVEY) INC State St & Bostwick Ave Bridgeport 2 Conn (1 thru 6, 12)—ADV PG 76, 77**
Industrial Automation Corp 2415 W Montrose Ave Chicago Ill (6)
Joy Mfg Co Electrical Products Div 1201 Macklin Ave St Louis 10 Mo (3-4-6)
●**KILLARK ELECTRIC MFG CO 3940 Easton Ave St Louis 13 Mo (6)—ADV PG 86-87**
Knox Porcelain Corp 2706 Mynders Ave (P O Box 2031) Knoxville 1 Tenn (1-2-4-5-6)
Kulka Electric Corp 633 S Fulton Ave Mount Vernon NY (1-2)
Leviton Mfg Co Inc 236 Greenpoint Ave Brooklyn 22 NY (1-2-4-5-6)
Massey (A H) Inc 111 3rd St (P O Box 206) Derby Conn (1-2-3-4)
McKinley (Ben P) Co 522 S Clinton St Chicago 7 Ill (2-4-5)
Midwest Electric Products Inc 1515 N Front St Mankato Minn (1-3-4-6)
Murray (O A) Co Inc 632 N Mill St Tipton Ind (1)
PLM Products Inc 3871 W 150 St Cleveland 11 Ohio (4)
Pass & Seymour Inc Syracuse 9 NY (1-2-4-5-6)
Perfect-Line Mfg Corp Old Country Rd & Railroad Ave P O Box 65 Hicksville LI NY (6)
Pyle-National Co 1344 N Kostner Ave Chicago 51 Ill (3-4-6)
Rab Electric Mfg Co Inc 605 E 132 St New York 54 NY (6)
Ralco Mfg Co 123-141 N Albany Ave Chicago 12 Ill (4)
Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa (1-2-3-4-5-7)
Royal Electric Corp 95 Grand Ave Pawtucket RI (1 thru 7)
●**SIERRA ELECTRIC CORP 15100 S Figueroa Gardena Calif (2-3-5)—ADV PG 117**
Slater Electric & Mfg Co Inc 45 Sea Cliff Ave Glen Cove NY (2-4-5-6)
Sta-Tite Mfg Co 2000 Wyandotte Kansas City 8 Mo (1)
Standard Electric Time Co 89 Logan St Springfield 2 Mass (3)
Standard Portable Cord Co Inc Mayville NY (1)
Star-A Electric Mfg Co Inc 269 Messerole St Brooklyn 6 NY (1-2-4-5-6)
Stonco Electric Products Co 333 Monroe Ave Kenilworth NJ (2-6)
Superior Electric Co 83 Laurel St Bristol Conn (4)
Tevco Insulated Wire 108 E Prospect Ave Burbank Calif (8-9)
Tigerman Engineering Co 4332 N Western Ave Chicago 18 Ill (6)
Urell Inc 43 Main St Bradford Pa (1)
Wilkoff (M J) Co 823 Locust Pittsburgh 19 Pa (5)
●**WIREMOLD CO Hartford 10 Conn (3)—ADV PG 125**
Woodhead (Daniel) Co 15 N Jefferson St Chicago 6 Ill (1-4)

5C. LAMP ACCESSORIES

1. Ballasts
2. Bayonet sockets
3. Bipost sockets
4. DC fluorescent resistors
5. Fluorescent lamp capacitors
6. Fluorescent lamp holders
7. Fluorescent thermal starters & sockets
8. Locks & guards
9. Lumiline lamp holders
10. Screw sockets
11. Socket adapters & reducers
12. Quartz lamp holders
13. Weatherproof sockets

Adjustable Fixture Co 104 E Mason St Milwaukee 2 Wis (10)
●**ADVANCE TRANSFORMER CO 2950 N Western Ave Chicago 18 Ill (1)—ADV PG 123**
Apollo Lighting Fixture Co Inc 162 W Third St Mt Vernon NY (2)
Arrow-Hart & Hegeman Electric Co 103 Hawthorn St Hartford 6 Conn (6-7-8-9-10-11)
Benjamin Div Thomas Industries Inc 207 E Broadway Louisville 2 Ky (3-10-11)
Bryant Electric Co 1421 State St (Box D Barnum Sta) Bridgeport 2 Conn (3-6-7-8-10-11)
Cable Electric Products Inc 234 Daboll St Providence 7 RI (6-7)
Chadsey Corp P O Box 1858 Hartford 1 Conn (8)
Circle F Mfg Co 720 Monmouth St Trenton 4 NJ (3-6-7-10-11)
Coil Co of America Inc 207-209 Washington St Northvale NJ (1)
Crouse-Hinds Co Syracuse 1 NY (10)
Day-Ray Products Inc 1133 Mission St South Pasadena Calif (1-6)
Dependable-Electric Mfg Co Inc 537 Johnson Ave Brooklyn 37 NY (5)
Derrick Light & Equipment Co 1201 E Daggett (P O Box 414) Fort Worth Tex (10)
Dialight Corp 60 Stewart Ave Brooklyn 37 NY (2-10)
Drake Mfg Co 4626 N Olcott Harwood Heights Chicago 31 Ill (2-10)
Dura Electric Lamp Co Inc 62 E Bigelow St Newark 8 NJ (7)
Duro-Test Corp 2321 Hudson Blvd North Bergen NJ (1-6-7-11)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (2-8-10-11-13)
Earl Electric Mfg Corp 35-20 Borden Ave Long Island City NY (7)
Electric Cord Co 432 Plane St Newark 2 NJ (8)
Ericson Mfg Co 1660 Hayden Ave Cleveland 12 Ohio (8-10)
France Mfg Co 10325 Berea Rd Cleveland 2 Ohio (1)
Gem Electric Mfg Co Inc 237 37th St Brooklyn NY (10-11)
General Electric Co Apparatus Sales Div Schenectady 5 NY (1-5)
General Electric Co Wiring Device Dept 95 Hathaway St Providence RI (6-7-9-10-11)
Gets-A-Lite Co 3865 N Milwaukee Ave Chicago 41 Ill (8)
Girard-Hopkins 1000 40th Ave Oakland 1 Calif (5)
Hubbell (Harvey) Inc State St & Bostwick Ave Bridgeport 2 Conn (6-7-10-11)
Jackson Electrical Co 900 W Van Buren St Chicago 7 Ill (10)
Jefferson Electric Co 25th & Madison Bellwood Ill (1)
Knox Porcelain Corp 2706 Mynders Ave (P O Box 2031) Knoxville 1 Tenn (10)
Kulka Electric Corp 633 S Fulton Ave Mount Vernon NY (1-2-6-7-10-11)
Laduby Co Inc Boston Post Rd (P O Box 88) Branford Conn (8)
Lectrohm Inc 5560 Northwest Highway Chicago 30 Ill (4)
Leviton Mfg Co Inc 236 Greenpoint Ave Brooklyn 22 NY (6-7-9-10-11)
Marco Industries 207 S Helena St Anaheim Calif (10)
Marvel Lamp Co 307 Newark St Hoboken NJ (7)
Massey (A H) Inc 111 3rd St (P O Box 206) Derby Conn (10)
McGill Mfg Co Inc Valparaiso Ind (8)
Miskella Infra-Red Co E 73rd & Grand Ave Cleveland 4 Ohio (12)
Morse (Frank W) Co 354 Congress St Boston 10 Mass (2-11)
Pass & Seymour Inc Syracuse 9 NY (6-7-10-11)
Pattern Products Co Inc P O Box 135 Union NJ (8)
Perfect-Line Mfg Corp Old Contry Rd & Railroad Ave P O Box 65 Hicksville LI NY (10)
Pyle-National Co 1344 N Kostner Ave Chicago 51 Ill (10)
Radionic Transformer Co 411 S Sangamon St Chicago 7 Ill (1)
Ralco Mfg Co 123-141 N Albany Ave Chicago 12 Ill (10)
Robertson Transformer Co Thornton Road Blue Island Ill (1)
Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa (10-11)
Royal Electric Corp 95 Grand Ave Pawtucket RI (7-10)
Slater Electric & Mfg Co Inc 45 Sea Cliff Ave Glen Cove NY (10)
Sola Electric Co 1719 Busse Rd Elk Grove Ill (1)
Star-A Electric Mfg Co Inc 269 Meserole St Brooklyn 6 NY (6-7-10-11)
Stratfield Co 434 Grand St Bridgeport 4 Conn (1)
Suclar Laboratories Inc 1197 McCarter Highway Newark NJ (7)
Superior Electric Co 83 Laurel St Bristol Conn (1)
Surelite Products Co 368 E 148 St New York 55 NY (7)
Swedish Iron & Steel Corp 910 Westfield Ave Elizabeth NJ (1-6)
Sylvania Electric Products Inc 1740 Broadway NY 19 NY (7)
Union Insulating Co Inc Box 351 Parkersburg W Va (10)
Universal Mfg Corp 29-51 E 6th St Paterson NJ (1)
Ward Leonard Electric Co 28 South St Mount Vernon NY (4)
Westinghouse Electric Corp PO Box 868 Pittsburgh 30 Pa
Westinghouse Electric Corp Lighting Div 1216 W 58th St (P O Drawer 5817) Cleveland 1 Ohio (1)
Woodhead (Daniel) Co 15 N Jefferson St Chicago 6 Ill (8-10)

5D. BOXES, WIRING

1. Concrete, sidewalk & underground
2. Explosion-proof
3. Floor
4. Interior wall & ceiling
5. Non-metallic
6. Pole base
7. Submersible
8. Weatherproof

Boxes for installation of wiring devices, for splices and connectors, and for pulling conductors into raceways. For boxes enclosing equipment, see "Cabinets" in index.

Adalet Mfg Co 14300 Lorain Ave Cleveland 11 Ohio (1-2-6-8)

Adam (Frank) Electric Co 3647 Windsor Pl St Louis Mo (3-4)
Alhambra Foundry Co Ltd 1147 Meridian Ave Alhambra Calif (1-7-8)
●ALL-STEEL EQUIPMENT INC Aurora Ill (4)—ADV PG 73
Alwalt Mfg Co 1706 Lapham Dr Modesto Calif (1-3-7-8)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 Ill (1-2-4-8)
●ARROLET CORP Foot of Bower St Montgomery Pa (4-8)—ADV PG 136
●ARROW CONDUIT & FITTINGS CORP 129 30th St Brooklyn 32 NY (1-4)—ADV PG 127
Barber Electric Mfg Co Inc 30 Chestnut St N Attleboro Mass (8)
●BELL ELECTRIC CO 5735 S Claremont Ave Chicago 36 Ill (8)—ADV PG 108-112-118
Bonnell Electric Mfg Co Inc 192-194 Chambers St NY 7 NY (1-7-8)
Bowers Mfg Co Inc 6700 Avalon Blvd Los Angeles 3 Calif (4)
Buckles (Chris) Inc 4830 S Hoyne Ave Chicago 9 Ill (4)
Burns (James F) Co 1601 Industrial Highway Pennsauken NJ (1-2-3-4-7-8)
Calvert Co 19851 Ingersoll Dr Rocky River 16 Ohio (4)
Columbia Metal Box Co 260 E 143 St NY 51 NY (4-8)
●CROUSE-HINDS CO Syracuse 1 NY (1 thru 8)—ADV PG 4th COVER
Dependable-Electric Mfg Co Inc 537 Johnson Ave Brooklyn 37 NY (4)
Derrick Light & Equipment Co 1201 E Daggett (P O Box 414) Fort Worth Tex (6-8)
Electrical Fittings Corp 37-50 57th St Woodside 77 NY (4)
Eliza Metal Products Co Box 408 Bridgeville Pa (4)
●FULLMAN MFG CO 1209-1215 Jefferson St Latrobe Pa (3-6)—ADV PG 118-120
G & W Electric Specialty Co 3500 W 127 St Blue Island Ill (1-2-7)
Gemco Electric Co 25685 W Eight Mile Rd Detroit 40 Mich (2-4-7-8)
General Metals Inc 858 Goldsbro Greensboro NC (8)
●GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (4-8)—ADV PG 2
●HOFFMAN ENGINEERING CORP 1050 Tyler St Anoka Minn (8)—ADV PG 122-134
●HOPE ELECTRICAL PRODUCTS CO INC 27 Long Ave Hillside NJ (1-2-6-7-8)—ADV PG 106
Huenefeld Co Engineered Products Div 2701 Spring Grove Ave Cincinnati 25 Ohio (8)
Ideal-Simplet Fittings Inc 5136 Park Ave Sycamore Ill (1-4-8)
Kees (F D) Mfg Co 700 Park Ave Beatrice Neb (8)
●KEYSTONE MFG CO 23328 Sherwood Rd Warren Mich (4-8)—ADV PG 133-139
Killark Electric Mfg Co 3940 Easton Ave St Louis 13 Mo (1-2-8)
Lew Electric Fittings Co 627 W Lake St Chicago 6 Ill (3)
Meco Metal Box & Panel Mfg Co Inc 2522 W Huntingdon St Phila 32 Pa (2-8)
Midwest Electric Products Inc 1515 N Front St Mankato Minn (4-8)
Moldcast Mfg Co 236 South St Newark 5 NJ (8)
National Electric Div H K Porter Co Inc Porter Bldg Pittsburgh 19 Pa (1-3)
Nelson Electric Mfg Co P O Box 5385 Tulsa Okla (2-8)
Newart Mfg Co 6725 Machinery Ave Cleveland Ohio (4)
●O Z ELECTRICAL MFG CO INC 262 Bond St Brooklyn 17 NY (2-7-8)—ADV PG 109
Palmer Electric & Mfg Co 24 Water St Wakefield Mass (7)
Parker Electrical Mfg Co 221 Washington St Oakland 7 Calif (4-8)
Perfect-Line Mfg Corp Old Country Rd & Railroad Ave P O Box 65 Hicksville LI NY (1-4-8)
Pyle-National Co 1344 N Kostner Ave Chicago 51 Ill (2-8)
Queen Products Co Inc Thirteenth & Rowan Sts Louisville 3 Ky (4-8)
Rab Electric Mfg Co Inc 605 E 132 St New York 54 NY (1-2-8)
Raco Mfg Co 123-141 N Albany Ave Chicago 12 Ill (2)
Richards (J R) Co P O Box 482 Carnegie Pa (1-3-4-5)
Rusgreen Mfg Co 14262 Birwood Ave Detroit 38 Mich (1-2-3-4-7-8)
Russell & Stoll Co Inc 125 Barclay St NY 7 NY (2-4-8)
●SPRING CITY ELECTRICAL MFG CO Spring City 85 Pa (1-2-3-4-6-7-8)—ADV PG 141-144
Steel City Electric Co 1207 Columbus Ave Pittsburgh 33 Pa (1-3-4)
Stonco Electric Products Co 333 Monroe Ave Kenilworth NJ (4-8)
Sun Electric Products Inc 28 S Day St Orange NJ (4)
Thepitt Mfg Co Gregg & Hammond Sts Carnegie Pa (4)
Union Insulating Co Inc Box 351 Parkersburg W Va (4-5)
V V Fittings Co P O Box 1253 Merchantville NJ (4)
Williams (H E) Products Co 106 S Main St Carthage Mo (4)
Woodhead (Daniel) Co 15 N Jefferson St Chicago 6 Ill (8)
Young Electric & Mfg Co Inc 2134 Curtis Denver 2 Colo (1-3-8)

5E. BOX HARDWARE

1. Covers & Plates
2. Hickeys
3. Knockout blanks
4. Studs
5. Supports & hangers
6. Cable-to-box connectors
7. Weatherproof box covers & plates
8. Floor outlet nozzles
9. Explosion-proof unions

Accessories used with wiring boxes. See also "Fixture Hangers" and "Conduit Fittings".

Adalet Mfg Co 14300 Lorain Ave Cleveland 11 Ohio (6)
●ALL-STEEL EQUIPMENT INC Aurora Ill (1-5)—ADV PG 73
Allen-Stevens Conduit Fittings Corp 33-53 62nd St Woodside 77 NY (6)
Allied Industries Inc P O Box 119 Ogallala Neb (6)
Anderson Electric Corp P O Drawer 2151 Birmingham 1 Ala (6)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 Ill (1-2-3-5-6)
●ARROLET CORP Foot of Bower St Montgomery Pa (1-3-5)—ADV PG 136
●ARROW CONDUIT & FITTINGS CORP 129 30th St Brooklyn 32 NY (1-5)—ADV PG 127
Arrow-Hart & Hegeman Electric Co 103 Hawthorn St Hartford 6 Conn (1)
Badger Die Casting Corp 201 W Oklahoma Ave Milwaukee 7 Wis (6)
●BALL ELECTRIC CO 5735 S Claremont Ave Chicago 36 Ill (1-7)—ADV PG 108-112-118
Benjamin Div Thomas Industries Inc 207 E Broadway Louisville 2 Ky (1)
Blackhawk Industries 250 S Main St Dubuque Iowa (3-5)
Bowers Mfg Co Inc 6700 Avalon Blvd Los Angeles 3 Calif (1 thru 5)
Burns (James F) Co 1601 Industrial Highway Pennsauken NJ (1-3-5)
Bryant Electric Co 1421 State St (Box D Barnum Sta) Bridgeport 2 Conn (1)
●BUCHANAN ELECTRICAL PRODUCTS CORP 434 US Route 22 Hillside NJ (3-6)—ADV PG 129-132-137
Burbank Electrical Products 215 W Palm Ave P O Box 7 Burbank Calif (5)
Cable Electric Products Inc 234 Daboll St Providence 7 RI (1)
Circle F Mfg Co 720 Monmouth St Trenton 4 NJ (1)
Conduit Fittings Corp 6400 W 66th St Chicago 38 Ill (4-6)
Crouse-Hinds Co Syracuse 1 NY (1-3-5)
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill (6)
Dossert Mfg Corp 249-255 Huron St Brooklyn 22 NY (6)
Duro Fittings Co 2210 S Davie Ave Los Angeles 22 Calif (4-6)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (1)
Earl Electric Mfg Corp 35-20 Borden Ave Long Island City NY (1)
Elliott Electric Products Co 1513 Olmstead Ave New York 62 NY (1 thru 6)
Fullman Mfg Co 1209-1215 Jefferson St Latrobe Pa (1-5)
Gedney Electric Co Americas Bldg Radio City NY 20 NY (2-4-6)
General Electric Co Wiring Device Dept 95 Hathaway St Providence RI (1)
General Metals Inc 858 Goldsbro Greensboro NC (1-3-5)
Halex Die Casting Co 8640 Bessemer Cleveland 27 Ohio (6)
Heyman Mfg Co Kenilworth 20 NJ (6)
●HUBBELL (HARVEY) INC State St & Bostwick Ave Bridgeport 2 Conn (1)—ADV PG 76-77
Huenefeld Co Engineered Products Div 2701 Spring Grove Ave Cincinnati 25 Ohio (1)
●IDEAL INDUSTRIES INC 5136 Park Ave Sycamore Ill (5)—ADV PG 88-89
Ideal-Simplet Fittings Inc 5136 Park Ave Sycamore Ill (1-3-5)
Kees (F D) Mfg. Co 700 Park Ave Beatrice Neb (5)
Keystone Mfg Co 23328 Sherwood Rd Warren Mich (1-5)
Killark Electric Mfg Co 3940 Easton Ave St Louis 13 Mo (6)
Knox Porcelain Corp 2706 Mynders Ave (P O Box 2031) Knoxville 1 Tenn (1)
Kruse-Rieke Auburn Ind (5)
Leviton Mfg Co Inc 236 Greenpoint Ave Brooklyn 22 NY (1)
Lew Electric Fittings Co 627 W Lake St Chicago 6 Ill (1-3)
●LINT (CLYDE W) 2323 W 18 St Chicago 8 Ill (3-5)—ADV PG 122
M & W Electric Mfg Co Inc S Walnut St (P O Box 87) East Palestine Ohio (6)
Madison Equipment Co 5405 Detroit Ave Cleveland 2 Ohio (1 thru 6)
Massey (A H) Inc 111 3rd St (P O Box 206) Derby Conn (1)
McKinley (Ben P) Co 522 S Clinton St Chicago 7 Ill (1-5)
Metalectrics Inc 677 Broadway NY 12 NY (2-4-6)
Metro Casting Co Inc 47 Grattan St Brooklyn 37 NY (6)
Midwest Electric Mfg Co 1639 Walnut St Chicago 12 Ill (2-3-4-6)
Newart Mfg Co 6725 Machinery Ave Cleveland Ohio (5)
●O Z ELECTRICAL MFG CO INC 262 Bond St Brooklyn 17 NY (6)—ADV PG 109
Paine Co Fullerton Ave & Westgate Rd Addison Ill (5)
Pass & Seymour Inc Syracuse 9 NY (1)
Perfect-Line Mfg Corp Old Country Rd & Railroad Ave P O Box 65 Hicksville LINY (1)
Pucel Enterprises Inc 3746 Kelley Ave Cleveland 14 Ohio (1)
Pyle-National Co 1344 N Kostner Ave Chicago 51 Ill (6)
Queen Products Co Inc Thirteenth & Rowan Sts Louisville 3 Ky (1)
Rab Electric Mfg Co Inc 605 E 132 St New York 54 NY (3)
Raico Mfg Co 123-141 N Albany Ave Chicago 12 Ill (9)
Rattan Mfg Co 10 Wall St (P O Box 1745) New Haven 7 Conn (2-4-6)
Red Seal Electric Co 10307 Detroit Ave Cleveland 2 Ohio (6)
Redi-Bolt Inc 5334 Indianapolis Blvd East Chicago Ind (4-5)
Reichert Float and Mfg Co 2242 Smead Ave Toledo 6 Ohio (3)
Richards (J R) Co P O Box 482 Carnegie Pa (1-3-4-5)
Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa (1)
Royal Electric Corp 95 Grand Ave Pawtucket RI (1-7)
Rusgreen Mfg Co 14262 Birwood Ave Detroit 38 Mich (6)
●SIERRA ELECTRIC CORP 15100 S Figueroa Gardena Calif (1)—ADV PG 117
Slater Electric & Mfg Co Inc 45 Sea Cliff Ave Glen Cove NY (1)
Spring City Electrical Mfg Co Spring City 85 Pa (1)
Star-A Electric Mfg Co Inc 269 Meserole St Brooklyn 6 NY (1)
Steel City Electric Co 1207 Columbus Ave Pittsburgh 33 Pa (1-2-3-4-5)
Steel Electric Products Co Inc 5602 18th Ave Brooklyn 4 NY (1 thru 5)
Stonco Electric Products Co 333 Monroe Ave Kenilworth NJ (1)
Thepitt Mfg Co Gregg & Hammond Sts Carnegie Pa (6)
Thomas & Betts Co 36 Butler St Elizabeth 1 NJ (3-5-6)
Williams (H E) Products Co 106 S Main St Carthage Mo (1-5)
Yorkville Metal Products Co 677 Broadway NY 12 NY (2-4-6)

5F. CABINETS, HOUSINGS & ENCLOSURES

1. Fuse & cutout
2. Meter
3. Panelboard
4. Switch & circuit breaker
5. Transformer
6. Weatherproof
7. Explosion-proof
8. Trolley wire protective enclosures

Enclosures only; used for mounting and protection of equipment.

Adam (Frank) Electric Co 3647 Windsor Pl St Louis Mo (1-3-4)
Alwalt Mfg Co 1706 Lapham Dr Modesto Calif (1-2-3-5)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 Ill (7)
Barber Electric Mfg Co Inc 30 Chestnut St N Attleboro Mass (1-5)
Bonnell Electric Mfg Co Inc 192-194 Chambers St NY 7 NY (3-4)
Burns (James F) Co 1601 Industrial Highway Pennsauken NJ (1-2-3-4-5)
Cleveland Switchboard Co 2925 E 79 St Cleveland 4 Ohio (3)
Code Equipment Sales Co P O Box 5847 Philadelphia 28 Pa (2)
Columbia Metal Box Co 260 E 143 St NY 51 NY (1-3-5)
Continental Electric Equipment Co Box 1055 Cincinnati 1 Ohio (3-5)
Crouse-Hinds Co Syracuse 1 NY (1-3-4-7)
Cutler-Hammer Inc 228 N 12th St Milwaukee 1 Wisc (1-2-3-4)
Derrick Light & Equipment Co 1201 E Daggett (P O Box 414) Fort Worth Tex (4-6)
Eliza Metal Products Co Box 408 Bridgeville Pa (3)
Falstrom Co 62 Falstrom Court Passaic NJ (2-3-4-5)
Gemco Electric Co 25685 W Eight Mile Rd Detroit 40 Mich (3-5)
General Metals Inc 858 Goldsbro Greensboro NC (1-2)
●HOFFMAN ENGINEERING CORP 1050 Tyler St Anoka Minn (1 thru 6)—AV PG 122-134
●HOPE ELECTRICAL PRODUCTS CO INC 27 Long Ave Hillside NJ (1-5)—ADV PG 106
●HUENEFELD CO Engineered Products Div 2701 Spring Grove Ave Cincinnati 25 Ohio (1-3-4-5)—ADV PG 115
●KEES (F D) MFG CO 700 Park Ave Beatrice Neb (2-5)—ADV PG 138
●KEYSTONE MFG CO 23328 Sherwood Rd Warren Mich (1 thru 5)—ADV PG 133-139

●KILLARK ELECTRIC MFG CO 3940 Easton Ave St Louis 13 Mo (3-4-5)—ADV PG 86-87
Kolton Electric Mfg Co 123 New Jersey Railroad Ave Newark 5 NJ (3-4-5)
Littleford Bros Inc 453 E Pearl St Cincinnati 2 Ohio (3)
Meco Metal Box & Panel Mfg Co Inc 2522 W Huntingdon St Phila 32 Pa (1-3-5)
Midwest Electric Products Inc 1515 N Front St Mankato Minn (1-4)
Moldcast Mfg Co 236 South St Newark 5 NJ (6)
Mullenbach Div Electric Machinery Mfg Co 2100 E 27 St Los Angeles 58 Calif (3)
Murray Mfg Corp 1250 Atlantic Ave Brooklyn 16 NY (4-5)
Nelson Electric Mfg Co P O Box 5385 Tulsa Okla (3)
Northbrook Products Inc Industrial Div 624 S Michigan Ave Chicago 5 Ill (8)
Palmer Electric & Mfg Co 24 Water St Wakefield Mass (1 thru 5)
Parker Electrical Mfg Co 221 Washington St Oakland 7 Calif (1 thru 5)
Queen Products Co Inc Thirteenth & Rowan Sts Louisville 3 Ky (1-2-3-4-5)
Russell & Stoll Co Inc 125 Barclay St New York 7 NY (7)
●SPRING CITY ELECTRICAL MFG CO Spring City 85 Pa (1 thru 5-7)—ADV PG 141-144
Square D Co 6060 Rivard St Detroit 11 Mich (1-2-3-4-5)
Standard Electric Time Co 89 Logan St Springfield 2 Mass (3)
Sun Electric Products Inc 28 S Day St Orange NJ (1-3-5)
V V Fitting Co P O Box 1253 Merchantville NJ (1)
Wadsworth Electric Mfg Co Inc 20-34 W 11th St (Box 272) Covington Ky (1-3-4-5)
Young Electric & Mfg Co Inc 2134 Curtis Denver 2 Colo (1-2-3-4-5)

5G. FIXTURE HANGERS & SUPPORTS

1. Fixed
2. Disconnecting type

Stems, channels, brackets and chain for permanent support of lighting fixtures. For poles and standards, see index.

Acme Lighting & Mfg Co 949 E 31 St Los Angeles 11 Calif (1)
Allen-Stevens Conduit Fittings Corp 33-53 62nd St Woodside 77 NY (1)
Benjamin Div Thomas Industries Inc 207 E Broadway Louisville 2 Ky (1)
Bowers Mfg Co Inc 6700 Avalon Blvd Los Angeles 3 Calif (1)
Crouse-Hinds Co Syracuse 1 NY (1)
Eagle Mfg Co 3508 Avalon Blvd Los Angeles 11 Calif (1)
Elliott Electric Products Co 1513 Olmstead Ave New York 62 NY (1)
Federal Shock Mount Corp 1060 Washington Ave New York 56 NY (1)
Gedney Electric Co Americas Bldg Radio City NY 20 NY (1)
●GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY—ADV PG 4-148
Hubbard & Co 6301 Butler St Pittsburgh 1 Pa (1)
Ideal Industries Inc 5136 Park Ave Sycamore Ill (1)
Jackson Electrical Co 900 W Van Buren St Chicago 7 Ill (1)
Kees (F D) Mfg Co 700 Park Ave Beatrice Neb (1)
Killark Electric Mfg Co 3940 Easton Ave St Louis 13 Mo (1)
Lint (Clyde W) 2323 W 18 St Chicago 8 Ill (1)
Madison Equipment Co 5405 Detroit Ave Cleveland 2 Ohio (1)
Metalectrics Inc 677 Broadway NY 12 .NY (1)
Mult-A-Frame Div Ainsworth Precision Castings Co 1471-77 E Atwater St Detroit 7 Mich (1)
Multi Electric Mfg Inc 4223 W Lake St Chicago 24 Ill (1)
Paine Co Fullerton Ave & Westgate Rd Addison Ill (1)
Pyle-National Co 1344 N Kostner Ave Chicago 51 Ill (1)
Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa (1)
Steel City Electric Co 1207 Columbus Ave Pittsburgh 33 Pa (1)
Steel Electric Products Co Inc 5602 18th Ave Brooklyn 4 NY (1)
Thompson Electric Co P O Box 873 Cleveland 22 Ohio (2)
Tomic Sales & Engineering Co 20000 Sherwood Ave Detroit 34 Mich (1)
Unistrut Products Co 933 Washington Blvd Chicago 7 Ill (1)
Versabar Corp 14 Whyte St Jersey City NJ (1)
Wil-Son Mfg Co Cloverport Ky (1)
Yorkville Metal Products Co 677 Broadway NY 12 NY (1)

5H. METER SOCKETS & MOUNTINGS

Sockets, troughs and accessories for kw-hr meters. See Sec. 5F for meter cabinets.

Anchor Mfg Co P O Box 959 Manchester NH
Code Equipment Sales Co P O Box 5847 Philadelphia 28 Pa
General Electric Co Apparatus Sales Div Schenectady 5 NY
General Switch Co 45 Roebling St Brooklyn 11 NY (5H)
Kees (F D) Mfg Co 700 Park Ave Beatrice Neb
Murray Mfg Corp 1250 Atlantic Ave Brooklyn 16 NY
Palmer Electric & Mfg Co 24 Waters St Wakefield Mass
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa

TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers* on the Free Information cards elsewhere in this issue.

*Code No.	Description, Pages Catalog No. & Mfr.
5-1	Explosion-Proof Housings; 16p; Cat. No. 160 (Adalet)
5-2	Electrical Wiring Devices; 85p (Bell)
5-3	Wiring Devices; 80p; Cat. No. 31-C-7 (Eagle)
5-4	Electrical Specialties; 15p; Cat. No. 53 (Ericson)
5-5	Meter Sockets; 4p; Cat. No. 140 (General Switch)
5-6	Electrical Enclosures; 20p; Cat. No. SP04758 (Hoffman)
5-7	Electrical Enclosures; 40p; Cat. No. CBW8 (Huenefeld)
5-8	Custom Boxes & Cabinets; 3p; Cat. No. B-159-B (Keystone)
5-9	Outlet Boxes & Switch Boxes; 11p; Cat. No. 31-C-71 (Keystone)
5-10	Distributor Contractor Items; 15p; Cat. No. 1101 (Leviton)
5-11	Electrical Wiring Devices; 120p; Cat. No. 56 (Leviton)
5-12	Boxes; 14p (Queen Products)
5-13	Electrical Fittings, Boxes, Grips; 50p; Cat. No. 3 (Ralco)
5-14	Fluorescent Ballasts; 12p; Cat. No. SOL-9-610 (Sola)
5-15	Lighting Supports; 8p; Cat. No. G-2 (Steel City)
5-16	Electrical Enclosures; 24p; Cat. No. 2-59-R (Sun)
5-17	Fluorescent Ballasts; 7p (Universal)

SECTION 6. CONDUCTORS AND CONNECTORS

Wire and cable are listed in 6A, 6B and 6C by code letter designations used in the National Electrical Code; Sections 6D and 6E list applications.

Wire and cable tools are listed in 12B; underground supports, poles, etc. in Sec. 1; raceways and enclosures in Sec. 7.

6A. BUILDING & POWER CABLE

1. A, AA, AI, AIA—asbestos
2. AC, ACT, ACV—armored cable
3. ACL—armored cable, lead-covered
4. AVA, AVB, AVL—asbestos & varnished cambric
5. MI—mineral-insulated, metal-sheathed
6. NM, NMC—non-metallic sheathed
7. Paper, underground service
8. R—Code rubber
9. RH, RHH—heat-resistant rubber
10. RH-RW, RHW—moisture & heat-resistant rubber
11. RW—moisture-resistant rubber
12. RU—latex rubber
13. RUH—heat-resistant latex rubber
14. RUW—moisture-resistant latex rubber
15. SB—slow-burning
16. SE, ASE, USE—service entrance
17. T—thermoplastic
18. TA—thermoplastic & asbestos
19. TW—moisture-resistant thermoplastic
20. UF—underground feeder & branch circuit
21. V—varnished cambric
22. WP—weatherproof
23. THW—heat-resistant thermoplastic
24. TBS—thermoplastic & fibrous braid
25. SA—silicone asbestos

Accurate Insulated Wire Corp 25 Fox St New Haven 13 Conn (8-17-19)
Acorn Insulated Wire Co 36 Freeman St Pawtucket RI (1-2-4-6-8-9-10-11-16-17-18-19-20-21)
American Electric Cable Co 181 Appleton St Holyoke Mass (19)
American Insulated Wire Corp 36 Freeman St Pawtucket RI (1-2-4-6-8-9-10-11-17-18-19-20-21-22)
American Metal Moulding Co 146 Coit St Irvington NJ (2-3-19)
●AMERICAN STEEL & WIRE DIV UNITED STATES STEEL CORP Rockefeller Bldg Cleveland 13 Ohio (1-3-7-8-9-10-11-15-16-17-18-19-21-22)—ADV PG—97-98-99-100
Anaconda Wire & Cable Co 25 Broadway New York 4 NY (4-6-7-8-9-10-11-16-17-18-19-20-21-22)
Chester Cable Corp Oakland Ave Chester NY (2-3-6-17-20)
Circle Wire and Cable Corp 5500 Maspeth Ave Maspeth LI NY (2-3-6-8-9-10-11-16-17-19-20-21-22)
Clifton Conduit Corp 3300 Eastbourne Ave Baltimore 24 MD (2-10-19)
●COLLYER INSULATED WIRE CO 249 Roosevelt Ave Pawtucket RI (1-4-6-8-9-10-11-16-17-18-19-20-21)—ADV PG 95
Columbia Cable & Electric Corp 255 Chestnut St Brooklyn 8 NY (2-3-6-17-19-20)
Continental Wire Corp P O Box 366 Wallingford Conn (1-4-17-18-19-20-21-23-24)
Copperweld Steel Co Wire and Cable Div Glassport Pa (22)
Cornish Wire Co Inc 50 Church St NY 7 NY (17)
●CRESCENT INSULATED WIRE & CABLE CO 319 N Olden Ave Trenton 5 NJ (2-3-6-8-9-10-11-16-17-19-20-21)—ADV PG 90
Diamond Wire & Cable Co 445 Park Ave Sycamore Ill (2-3-17-20-22-23)
Essex Wire Corp Wire & Cable Div 2601 S Adams Marion Ind (2-3-6-8-9-10-11-16-17-19-20-22-23)
Ettco Wire & Cable Corp 75 Onderdonk Ave Brooklyn 37 NY (2-6-16-17-19-20-23)
●GENERAL CABLE CORP 730 Third Ave New York 17 NY (1 thru 11—16 thru 22)—ADV PG 78-79
General Electric Co Wire & Cable Dept 1285 Boston Ave Bridgeport 2 Conn (1-2-3-4-6-9-10-11-16-18-19-20-21)
Hatfield Wire and Cable Div Continental Copper & Steel Indus Inc 487 Hillside Ave Hillside 5 NJ (2-6-9-10-11-16-19-20)
Kaiser Aluminum & Chemical Sales Inc Kaiser Center 300 Lake Side Drive Oakland 12 Calif (1-2-3-6-8-9-10-11-12-13-14-16-17-19-20-22)
Kennecott Wire and Cable Co Phillipsdale (Rumford 16) RI (3-7-15-21-22)
Narragansett Wire Co 541 Pawtucket Ave Pawtucket RI (6-9-16-19-20-22-23)
National Electric Div H K Porter Co Inc Porter Bldg Pittsburgh 19 Pa (1-2-3-4-6-9-10-16-18-19-20-21)
Nelson Electric Mfg Co P O Box 5385 Tulsa Okla (5)
Normandy Electric Wire Corp 125 Second St Brooklyn 31 NY (2)
Okonite Co Passaic NJ (1-4-7-9-10-11-16-19-21-22)
●PHELPS DODGE COPPER PRODUCTS CORP 300 Park Ave New York 22 NY (1-3-4-7-8-9-10-11-15-17-18-19-20-21-22)—ADV PG 84-85

Plastic Wire & Cable Corp E Main St Jewett City Conn (17-19-20)
Plastoid Corp 42-61 24th St LIC 1 NY (1-17-18-19-20)
Radix Wire Co 26260 Lakeland Blvd Cleveland 32 Ohio (1-2-4-6-17-18-19-20)
Rhode Island Insulated Wire Co Inc 50 Burnham Ave Cranston RI (1-6-17-21)
Rockbestos Wire & Cable Co Nicoll and Canner Sts New Haven 4 Conn (1-2-4-18-21)
Roebling's (John A) Sons Corp 640 S Broad St Trenton 2 NJ (7-9-10-11-16-17-19-20-21-22)
●ROME CABLE DIV ALUMINUM CO OF AMERICA 421 Ridge St Rome NY (6-8-9-10-16-19-20-22-23)—ADV PG 74-75
Royal Electric Corp 95 Grand Ave Pawtucket RI (1)
●SIMPLEX WIRE & CABLE CO 79 Sidney St Cambridge 39 Mass (2-4-6 thru 11-17-19-20-21)—ADV PG 93
Southwire Co Carrollton Ga (6-16-17-19-20-22-23)
●TRIANGLE CONDUIT & CABLE CO INC Triangle & Jersey Aves New Brunswick NJ (1-2-3-4-6-8-9-10-11-16-17-19-20-21)—ADV PG 3rd Cover
Victor Electric Wire & Cable Corp 618 Main St West Warwick RI (19)
Walker Brothers End St Conshohocken Pa (6-9-10-11-16-19-20-22)
Western Insulated Wire Co 2425 E 30th St Los Angeles 58 Calif (1-2-3-4-6-9-10-11-16-21)

6B. FIXTURE WIRE

1. AF—heat-resistant asbestos-covered
2. CF—heat-resistant cotton-covered
3. FF—rubber-covered flexible stranding
4. FFH—heat-resistant rubber-covered flexible stranding
5. RF—rubber-covered, solid or 7-strand
6. RFH—heat-resistant rubber-covered, solid or 7-strand
7. SF—silicone rubber, solid or 7-strand
8. SFF—silicone rubber, flexible stranding
9. TF—thermoplastic-covered, solid or stranded
10. TFF—thermoplastic-covered, flexible stranding

Accurate Insulated Wire Corp 25 Fox St New Haven 13 Conn (5-9-10)
Acorn Insulated Wire Co 36 Freeman St Pawtucket RI (1 thru 6-9-10)
American Electric Cable Co 181 Appleton St Holyoke Mass (9-10)
American Insulated Wire Corp 36 Freeman St Pawtucket RI (1 thru 6-9-10)
●AMERICAN STEEL & WIRE DIV UNITED STATES STEEL CORP Rockefeller Bldg Cleveland 13 Ohio (5-6-9-10)—ADV PG 97-98-99-100
Anaconda Wire & Cable Co 25 Broadway New York 4 NY (9-10)
Apex Wire & Cable Corp 237 37th St Brooklyn 32 NY (9-10)
Brand (William) American Enka Corp 31 Sudbury Rd Concord Mass (7-8-9-10)
Chester Cable Corp Oakland Ave Chester NY (9-10)
Circle Wire and Cable Corp 5500 Maspeth Ave Maspeth LI NY (2 thru 6-9-10)
●COLLYER INSULATED WIRE CO 249 Roosevelt Ave Pawtucket RI (1-3 thru 10)—ADV PG 95
Continental Wire Corp P O Box 366 Wallingford Conn (1-2-7-8-9-10)
Cornish Wire Co Inc 50 Church St NY 7 NY (3-9-10)
●CRESCENT INSULATED WIRE & CABLE CO 319 N Olden Ave Trenton 5 NJ (3-4-5-6-9-10)—ADV PG 90
Diamond Wire & Cable Co 445 Park Ave Sycamore Ill (1 thru 10)
Essex Wire Corp Wire & Cable Div 2601 S Adams Marion Ind (5-6-7-8-9-10)
Ettco Wire & Cable Corp 75 Onderdonk Ave Brooklyn 37 NY (9)
General Cable Corp 730 Third Ave New York 17 NY (1 thru 10)
General Electric Co Wire & Cable Dept 1285 Boston Ave Bridgeport 2 Conn (1-3-4-7-8-9-10)
Hatfield Wire and Cable Div Continental Copper & Steel Indus Inc 487 Hillside Ave Hillside 5 NJ (6-9-10)
Kaiser Aluminum & Chemical Sales Inc Kaiser Center 300 Lake Side Drive Oakland 12 Calif (1-2-3-4-5-6-7-8-9-10)
Lewis Engineering Co 52 Rubber Ave Naugatuck Conn (1)
National Electric Div H K Porter Co Inc Porter Bldg Pittsburgh 19 Pa (1-5-6-7-8-9-10)
Okonite Co Passaic NJ (1-3-4-5-6-8-9-10)
Phalo Plastics Corp 530 Boston Turnpike Shrewsbury Mass (9-10)
●PHELPS DODGE COPPER PRODUCTS CORP 300 Park Ave New York 22 NY (1-3-4-5-6-9-10)—ADV PG 84-85
Plastic Wire & Cable Corp E Main St Jewett City Conn (9-10)
Plastoid Corp 42-61 24th St LIC 1 NY (9-10)
Radix Wire Co 26260 Lakeland Blvd Cleveland 32 Ohio (1-9-10)
Rockbestos Wire & Cable Co Nicoll and Canner Sts New Haven 4 Conn (1)
●ROME CABLE DIV ALUMINUM CO OF AMERICA 421 Ridge St Rome NY (3-4-5-6-7-9-10)—ADV PG 74-75
Royal Electric Corp 95 Grand Ave Pawtucket RI (1-2-3-9-10)
●SIMPLEX WIRE & CABLE CO 79 Sidney St Cambridge 39 Mass (3 thru 10)—ADV PG 93
Southwire Co Carrollton Ga (9)
Surprenant Mfg Co 199 Washington St Boston 8 Mass (9-10)
●TRIANGLE CONDUIT & CABLE CO INC Triangle & Jersey Aves New Brunswick NJ (1 thru 10)—ADV PG 3rd Cover
Victor Electric Wire & Cable Corp 618 Main St West Warwick RI (9-10)
Walker Brothers End St Conshohocken Pa (9-10)
Western Insulated Wire Co 2425 E 30th St Los Angeles 58 Calif (1-4)

6C. FLEXIBLE CORD

1. AFC, AFPD, AFPO—asbestos-covered, heat-resistant
2. AFS, AFSJ—rubber-jacketed, heat-resistant
3. AVPD, AVPO—heat- and moisture-resistant
4. C—lamp
5. CA—armored
6. CFC, CFPD, CFPO—cotton-covered, heat-resistant
7. E, EO, ET—elevator cable
8. HC, HPD—heater
9. HPN—heater, all, neoprene
10. HS—heater, jacketed
11. HSJ—heater, rubber-jacketed
12. K—heavy-duty, braided
13. P—reinforced
14. PD—twisted portable
15. PO—parallel
16. PW—reinforced, moistureproof
17. S, SO, ST—hard service
18. SJ, SJO, SJT—hard service, junior
19. SP—parallel, all rubber
20. SPT—parallel, all plastic
21. SR, SRT—range cable
22. SV, SVT—vacuum cleaner
23. TP, TPT, TS, TST—tinsel

Accurate Insulated Wire Corp 25 Fox St New Haven 13 Conn (2-4-7 thru 23)
Acorn Insulated Wire Co 36 Freeman St Pawtucket RI (1-3-4-6-8 thru 22)
Alpha Wire Corp 200 Varick St New York 14 NY (15-17-19-20-22)
American Electric Cable Co 181 Appleton St Holyoke Mass (4-8-18-20-22)
American Insulated Wire Corp 36 Freeman St Pawtucket RI (1-2-4-6-8-9-10-11-13-14-15-17-18-19-20-22)
●AMERICAN STEEL & WIRE DIV UNITED STATES STEEL CORP Rockefeller Bldg Cleveland 13 Ohio (7-17-18)—ADV PG 97-98-99-100
Anaconda Wire & Cable Co 25 Broadway New York 4 NY (12-17-18)
Apex Wire & Cable Corp 237 37th St Brooklyn 32 NY (8-15-20)
Belden Mfg Co P O Box 5070A Chicago 80 Ill (8-9-10-11-17-18-19-20-21-22-23)
Chester Cable Corp Oakland Ave Chester NY (17-18-20-22)
Circle Wire and Cable Corp 5500 Maspeth Ave Maspeth LI NY (4-5-12-13-14-17-18-19-20-21)
●COLLYER INSULATED WIRE CO 249 Roosevelt Ave Pawtucket RI (17-18-20-21-22)—ADV PG 95
Columbia Cable & Electric Corp 255 Chestnut St Brooklyn 8 NY (5)
Continental Wire Corp P O Box 366 Wallingford Conn (1-3-6)
Coral Cable Co P O Box 260 Pawtucket RI (9-15-17-18-19-20-22)
Cornish Wire Co Inc 50 Church St NY 7 NY (4-8-9-11-15-17-18-20-22)
Crescent Co Inc 20 Central Ave Pawtucket RI (4-15-17-18-19-20-22)
●CRESCENT INSULATED WIRE & CABLE CO 319 N Olden Ave Trenton 5 NJ (12-14-15-17-18-19-20-22)—ADV PG 90
Diamond Wire & Cable Co 445 Park Ave Sycamore Ill (4-5-6-8-10-14-15-17 thru 23)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (20)
Essex Wire Corp Wire & Cable Div 2601 S Adams Marion Ind (4-7-8-9-11-12-13-15-17-18-19-20-21-22)
General Cable Corp 730 Third Ave New York 17 NY (1 thru 22)
General Electric Co Wire & Cable Dept 1285 Boston Ave Bridgeport 2 Conn (1-2-3-8-9-15-17-18-19-20-21-22)
General Insulated Wire Works Inc 69 Gordon Ave Providence 5 RI (8 thru 11-17-18-19-20-21-22-23)
Hatfield Wire and Cable Div Continental Copper & Steel Indus Inc 487 Hillside Ave Hillside 5 NJ (4-7 thru 23)
Kaiser Aluminum & Chemical Sales Inc Kaiser Center 300 Lake Side Drive Oakland 12 Calif (1 thru 20-22-23)
National Electric Div H K Porter Co Inc Porter Bldg Pittsburgh 19 Pa (1-2-18)
Normandy Electric Wire Corp 125 Second St Brooklyn 31 NY (17)
Okonite Co Passaic NJ (2-4-7-17 thru 21)
Phalo Plastics Corp 530 Boston Turnpike Shrewsbury Mass (18-20-21-22-23)
●PHELPS DODGE COPPER PRODUCTS CORP 300 Park Ave New York 22 NY (4-17-18-19-20-22)—ADV PG 84-85
Plastic Wire & Cable Corp E Main St Jewett City Conn (17-18-20-21-22-23)
Plastoid Corp 42-61 24th St LIC 1 NY (5-20)
Radix Wire Co 26260 Lakeland Blvd Cleveland 32 Ohio (1-20)
Rockbestos Wire & Cable Co Nicoll and Canner Sts New Haven 4 Conn (1-3)
Roebling's (John A) Sons Corp 640 S Broad St Trenton 2 NJ (7-17)
●ROME CABLE DIV ALUMINUM CO OF AMERICA 421 Ridge St Rome NY (7-14-15-17-18-19-20-21-22)—ADV PG 74-75
Royal Electric Corp 95 Grand Ave Pawtucket RI (1-4-6-8-9-10-11-13 thru 23)
Shallcross Controls Inc 2217-21 N 31 St Milwaukee 8 Wis (1)
●SIMPLEX WIRE & CABLE CO 79 Sidney St Cambridge 39 Mass (2-3-5-7-9-10-12-13-14-16 thru 21)—ADV PG 93
Star-A Electric Mfg Co Inc 269 Meserole St Brooklyn 6 NY (8-10-15-17-18-22)
●TRIANGLE CONDUIT & CABLE CO INC Triangle & Jersey Aves New Brunswick NJ (1-2-6-15-17-18-21-29-31-32)—ADV PG 3rd Cover
Victor Electric Wire & Cable Corp 618 Main St West Warwick RI (20-22-23)
Walker Brothers End St Conshohocken Pa (17-21)
Western Insulated Wire Co 2425 E 30th St Los Angeles 58 Calif (2-14-15-17-18-21-22)
Whitney Blake Co 102 Pershing St New Haven 14 Conn (4-9-11-17-18-19-20-22)

6D. SPECIFIC APPLICATIONS OF WIRE & CABLE

1. Airport
2. Appliance
3. Burn
4. Brewery
5. Bridge
6. Control
7. Electric furnace
8. Elevator
9. Gas tube sign
10. Ground
11. Heater
12. Lamp
13. Magnet
14. Marine
15. Parkway (Suburban)
16. Railway
17. Service drop
18. Service entrance
19. Signal & communications
20. Stage lighting
21. Submarine
22. Thermostat
23. Welding
24. Water-cooled leads
25. Lead wire
26. Electric fence
27. Trolley
28. Annunciator
29. Fixture
30. Bus drop
31. Series street lighting
32. Pump
33. Cathodic protection
34. Trailer
35. High voltage
36. Machine tool
37. Building

Accurate Insulated Wire Corp 25 Fox St New Haven 13 Conn (1-2-6-8-11-12-15-19-20)
Acorn Insulated Wire Co 36 Freeman St Pawtucket RI (2-3-4-6-10-11-12-17-18-19-20)
Alpha Wire Corp 200 Varick St New York 14 NY (1-2-6-13-19-25)
Alphaduct Wire & Cable Co 25 Van Dyke Ave (P O Box 709) New Brunswick NJ (19)
American Electric Cable Co 181 Appleton St Holyoke Mass (2-6-9-12-19-20)
American Insulated Wire Corp 36 Freeman St Pawtucket RI (1-2-3-4-6-11-12-15-17-18-19-20)
●AMERICAN STEEL & WIRE DIV UNITED STATES STEEL CORP Rockefeller Bldg Cleveland 13 Ohio (1-2-6-7-8-9-10-11-13 thru 21)—ADV PG 97-98-99-100
American Super-Temperature Wires Inc Winooski Vt (13)
Anaconda Wire & Cable Co 25 Broadway New York 4 NY (1 thru 21)
Ansonia Wire & Cable Co 111 Martin St Ashton RI (1-6-19)
Apex Wire & Cable Corp 237 37th St Brooklyn 32 NY (2-11-12)
Belden Mfg Co P O Box 5070A Chicago 80 Ill (2-9-11-2-13-14-19-23)
Brand (William) & Co Inc 51 North St Willimantic Conn (2-6-19)
Capitol Stage Lighting Co Inc 527 W 45 St New York 36 NY (20)
Chester Cable Corp Oakland Ave Chester NY (2-3-6-9-12-19-20)
Circle Wire and Cable Corp 5500 Maspeth Ave Maspeth LI NY (1-2-3-5-6-8-14-15-17-18-19-20)
Clifton Conduit Corp 3300 Eastbourne Ave Baltimore 24 Md (18)
●COLLYER INSULATED WIRE CO 249 Roosevelt Ave Pawtucket RI (2 thru 8-10-14 thru 20)—ADV PG 95
Continental Wire Corp P O Box 366 Wallingford Conn (6-22)

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330 W. 42nd St.
New York 36, N. Y.

Copperweld Steel Co Wire and Cable Div Glassport Pa (19)
Coral Cable Co P O Box 260 Pawtucket RI (6-19)
Cornish Wire Co Inc 50 Church St NY 7 NY (2-19-20)
Crescent Co Inc 20 Central Ave Pawtucket RI (12-17)
●CRESCENT INSULATED WIRE & CABLE CO 319 N Olden Ave Trenton 5 NJ (4-5-6-7-8-9-10-12-15-16-17-18-19-20)—ADV PG 90
Diamond Wire & Cable Co 445 Park Ave Sycamore Ill (2-4-6-7-8-11-12-15-17-18-19-20)
Driver (Wilbur B) Co 1875 McCarter Highway Newark 4 NJ (7-11)
Essex Wire Corp Wire & Cable Div 2601 S Adams Marion Ind (1-2-3-4-6-8-9-10-11-12-15-17-18-19-20)
●GENERAL CABLE CORP 730 Third Ave New York 17 NY (1 thru 23-25-27-28-29 thru 35)—ADV PG 78-79
General Electric Co Wire & Cable Dept 1285 Boston Ave Bridgeport 2 Conn (1-2-6-9-11-13-14-15-18-19-21)
General Insulated Wire Works Inc 69 Gordon Ave Providence 5 RI (2-6-10-11-12-17-18-19)
●GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (2-6-12-13-17-18)—ADV PG 2
Hatfield Wire & Cable Div Continental Copper & Steel Indus Inc 487 Hillside Ave Hillside 5 NJ (1-2-3-4-6-8-9-11-12-14 thru 20-23-29-35)
Hendrix Wire & Cable Corp Milford NH (17)
Hitemp Wires Inc 1200 Shames Dr Westbury NY (13-19)
Kaiser Aluminum & Chemical Sales Inc Kaiser Center 300 Lake Side Drive Oakland 12 Calif (1 thru 21-22-23-25-28-30-31-32-34-35)
Kennecott Wire & Cable Co Phillipsdale (Rumford 16) RI (7-13-16-19)
Lincoln Electric Co 22801 St Clair Ave Cleveland 17 Ohio (23)
Markel (L Frank) & Sons Norristown Pa (25)
Narragansett Wire Co 541 Pawtucket Ave Pawtucket RI (1-6-10-17-18)
National Electric Div H K Porter Co Inc Porter Bldg Pittsburgh 19 Pa (2-6-10-14-17-18-19-21)
New England Electrical Works Inc 365 Main St Lisbon NH (9-10-13-19)
Nichols Wire & Aluminum Co 1725 Rockingham Rd Davenport Iowa (26)
Normandy Electric Wire Corp 125 Second St Brooklyn 31 NY (14)
Okonite Co Passaic NJ (1-5-6-7-8-9-12 thru 21)
Page Steel & Wire Div American Chain & Cable Co Inc P O Box 692 Monessen Pa (23)
Partrick & Wilkins Co 51 N Seventh St Phila 6 Pa (19)
Phalo Plastics Corp 530 Boston Turnpike Shrewsbury Mass (2-6-8-19)
●PHELPS DODGE COPPER PRODUCTS CORP 300 Park Ave New York 22 NY (1-2-3-6-9-10-13-15-17-18-19)—ADV PG 84-85
Plastic Wire & Cable Corp E Main St Jewett City Conn (2-3-6-8-9-15-19-20)
Plastoid Corp 42-61 24th St LIC 1 NY (2-6-9-12-19-20)
Radix Wire Co 26260 Lakeland Blvd Cleveland 32 Ohio (2-3-6-7-10-11-12-19-20-32-34)
Reynolds Metals Co Richmond 18 Va (6-10-17-19)
Rhode Island Insulated Wire Co Inc 50 Burnham Ave Cranston RI (2-11-12-19)
Ringsdorff Carbon Corp Box 22 East McKeesport Pa (27)
Rockbestos Wire & Cable Co Nicoll and Canner Sts New Haven 4 Conn (2-6-7-8-19-21)
Roebling's (John A) Sons Corp 640 S Broad St Trenton 2 NJ (1-6-7-8-10-13-15 thru 19-21)
●ROME CABLE DIV ALUMINUM CO OF AMERICA 421 Ridge St Rome NY (1-2-3-6-8-10-12 thru 20-23-37)—ADV PG 74-75
Royal Electric Corp 95 Grand Ave Pawtucket RI (2-4-6-9-11-12-19-20-22-28-29-36)
Seeger-Williams Inc 4 Norman St Bridgeport 6 Conn (22)
Sequoia Wire & Cable Co 2201 Bay Rd (P O Box 1007) Redwood City Calif (2-6-19-20)
●SIMPLEX WIRE & CABLE CO 79 Sidney St Cambridge 39 Mass (19)—ADV PG 93
Sittler Corp 18 N Ada St Chicago 7 Ill (10-19)
South River Metal Products Co Inc 377 Turnpike South River NJ (10)
Southwire Co Carrollton Ga (3-6-10-17-19)
Star-A Electric Mfg Co Inc 269 Meserole St Brooklyn 6 NY (2-11-12)
Surprenant Mfg Co 199 Washington St Boston 8 Mass (2-6-19)
Telcon Inc P O Box 216 Pacific Palisades Calif (19-21)
Tensolite Insulated Wire Co Inc West Main St Tarrytown NY (2-6-13-19)
Times Wire & Cable Co Wallingford Conn (6)
●TRIANGLE CONDUIT & CABLE CO INC Triangle & Jersey Aves New Brunswick NJ (1-2-6-15-17-18-21-29-31-32)—ADV PG 3rd Cover
Victor Electric Wire & Cable Corp 618 Main St West Warwick RI (2-6-12-19)
Walker Brothers End St Conshohocken Pa (6-18-19)
Watteredge Co 19629 West Lake Rd Rocky River 16 Ohio (24)
Western Insulated Wire Co 2425 E 30th St Los Angeles 58 Calif (2-4-6-8-10-13-15-17-18-20)
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1 thru 21)—ADV PG 2nd Cover
Whitney Blake Co 102 Pershing St New Haven 14 Conn (6-10-16-19)

6E. PORTABLE CORD SETS

1. Extension
2. Molded integral
3. Range & dryer
4. Self-coiling & retractable
5. Appliance
6. Remote control

Includes sets with appropriate connecting bodies at both ends. For cords with lamps attached, see "Trouble Lamps" in index. For cord without connectors, see "Cord"

Accurate Insulated Wire Corp 25 Fox St New Haven 13 Conn (1-2-3-4)
Acorn Insulated Wire Co 36 Freeman St Pawtucket RI (1-3)
American Electric Cable Co 181 Appleton St Holyoke Mass (1)
Anaconda Wire & Cable Co 25 Broadway New York 4 NY (1-3)
Apex Wire & Cable Corp 237 37th St Brooklyn 32 NY (1-2)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 Ill (1)
Associated Engineering Corp 65 Kent St Brookline 46 Mass (1-2)
B & M Electric Corp 168 7th St Brooklyn 15 NY (1-2-6)
Beckley Electric Co Inc 468-470 Grand Ave Brooklyn 38 NY (1-2)
Belden Mfg Co P O Box 5070A Chicago 80 Ill (1-2-3)
Bell Electric Co 1844-50 W 21 St Chicago 8 Ill (1)
Benjamin Real Products Inc 10700 Broadway Cleveland 25 Ohio (4)
Black (M) Mfg Co 300-08 N Third St Phila 6 Pa (1)
Cable Electric Products Inc 234 Daboll St Providence 7 RI (1-3-5)
Capitol Stage Lighting Co Inc 527 W 45 St New York 36 NY (1)
Carol Cable Co 140 Middle St Pawtucket RI (1)
Circle F Mfg Co 720 Monmouth St Trenton 4 NJ (3)
Coral Cable Co P O Box 260 Pawtucket RI (1)
Cordomatic Div Vacuum Cleaner Corp of America 1724 W Indiana Ave Phila 32 Pa (4)
Cornish Wire Co Inc 50 Church St NY 7 NY (1-3)
Crescent Co Inc 20 Central Ave Pawtucket RI (1-2)
Diamond Wire & Cable Co 445 Park Ave Sycamore Ill (1-2-3-4)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (1-2-3)
Electri-Cord Mfg Co Inc 2554-2568 E 18 St Brooklyn 35 NY (5)
Ericson Mfg Co 1660 Hayden Ave Cleveland 12 Ohio (1-2)
Essex Wire Corp Wire & Cable Div 2601 S Adams Marion Ind (3)
Gem Electric Mfg Co Inc 237 37th St Brooklyn NY (1)
General Cable Corp 730 Third Ave New York 17 NY (1-2-3-4)
General Electric Co Wire & Cable Dept 1285 Boston Ave Bridgeport 2 Conn (1-3)
General Electric Co Wiring Device Dept 95 Hathaway St Providence RI (1-2-3)
General Insulated Wire Works Inc 69 Gordon Ave Providence 5 RI (1-2-4)
Haft & Sons Inc 950 Kent Ave Brooklyn 5 NY (1)
Koiled Kords Inc Box K Hamden Conn (4)
Midwest Electric Products Inc 1515 N Front St Mankato Minn (3)
Murray (O A) Co Inc 632 N Mill St Tipton Ind (1-2)
Phalo Plastics Corp 530 Boston Turnpike Shrewsbury Mass (1-2-3)
Phelps Dodge Copper Products Corp 300 Park Ave New York 22 NY (1)
Plastic Wire & Cable Corp E Main St Jewett City Conn (1-2-3-4)
Rhode Island Insulated Wire Co Inc 50 Burnham Ave Cranston RI (1)
Riverside Mfg & Electrical Supply Co 10228 Michigan Ave Dearborn Mich (2)
Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa (1-3)
Royal Electric Corp 95 Grand Ave Pawtucket RI (1)
Seeger-Williams Inc 4 Norman St Bridgeport 5 Conn (2)
Sperti Faraday Inc 1322 E Church St Adrian Mich (1-2)
Standard Portable Cord Co Inc Mayville NY (1)
Star-A Electric Mfg Co Inc 269 Meserole St Brooklyn 6 NY (1-3)
Victor Electric Wire & Cable Corp 618 Main St West Warwick RI (2)
Wilkoff (M J) Co 823 Locust Pittsburgh 19 Pa (3)

6F. CONNECTING & TERMINATING DEVICES

1. Connectors—pressure
2. Connectors—solderless
3. End seals
4. Lugs & terminals
5. Potheads
6. Splices, kits & equipment
7. Terminal blocks & binding posts
8. Screw-on wire connectors
9. Collecting rings, shoes & devices
10. Ground clamps
11. Welding cable connectors
12. Lifting magnet connectors
13. Environment-resistant connectors
14. Tube-to-cable connectors
15. Temporary power connectors

Accessories used for splicing, terminating, or connecting wire and cable to equipment or fittings.

AMP Inc Eisenhower Blvd Harrisburg Pa (1-4-6)
Adalet Mfg Co 14300 Lorain Ave Cleveland 11 Ohio (3-5)
Allen-Bradley Co 136 W Greenfield Ave Milwaukee 4 Wis (7)
Allied Industries Inc P O Box 119 Ogallala Neb (3)
Anaconda Wire & Cable Co 25 Broadway New York 4 NY (5-6)
Anderson (Albert & J M) Mfg Co 289 A St Boston 10 Mass (11-15)
Anderson Electric Corp P O Drawer 2151 Birmingham 1 Ala (1-3-4-6-10)
Anthony (F M) Co 773 University Ave Berkeley 10 Calif (1-4-6)
Blackburn (Jasper) Corp 1525 Woodson Rd St Louis 14 Mo (1)
Blaco Mfg Co 6541 Euclid Ave Cleveland 3 Ohio (10)
●BUCHANAN ELECTRICAL PRODUCTS CORP 434 U S Route 22 Hillside NJ (1-4-6-7)—ADV PG 129-132-137
Burndy Corp Norwalk Conn (1-4-6-7-8)
Cam Lok Div Empire Products Inc 9201 Blue Ash Rd (Box 98) Cincinnati 36 Ohio (1-4-6)
Camblock Corp 825 Bronx River Ave New York 72 NY (7)
Central Porcelain Co 507 Railroad St Columbiana Ohio (1-8)
Crouse-Hinds Co Syracuse 1 NY (13)
Curtis Development & Mfg Co 3244 N 33 St Milwaukee 16 Wis (7)
Dante Electric Mfg Co Bantam Conn (1-4)
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill (1-3-4-5-9)
Dossert Mfg Corp 249-255 Huron St Brooklyn 22 NY (1-4-6)
ETC Inc 990 E 67 St Cleveland 3 Ohio (1-4)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (8)
Earl (H W) & Co 6225 S W 8th St Miami 44 Fla (11-12)
Earl Electric Mfg Corp 35-20 Borden Ave Long Island City NY (4)
Eastern Specialty Co 3617 N 8th St Phila 40 Pa (7)
Elliott Electric Products Co 1513 Olmstead Ave New York 62 NY (1-3-4-6-8)
Emerson Plastics Corp 1383 Seabury Ave Bronx 61 NY (7)
Erico Products Inc 2070 E 61 Pl Cleveland 3 Ohio (1-4-11)
Esco Mfg Co P O Box 1039 Greenville Texas (5)
Fanner Mfg Co Electric Products Div Brookside Park Cleveland 9 Ohio (6)
Fargo Mfg Co Inc 845 Main St Poughkeepsie NY (1)
Frankel Connector Co 27 Vestry St NY 13 NY (2-4)
●G & W ELECTRIC SPECIALTY CO 3500 W 127 St Blue Island Ill (3-5-6)—ADV PG 110
General Electric Co Wiring Device Dept 95 Hathaway St Providence RI (1-4)
Generic Products Corp 107 Salem St Union Springs NY (7)
Hi-Scale Products Corp 132 W 22nd St NY 11 NY (2)
Hollingsworth Co Solderless Terminal Div Box 430 Phoenixville Pa (1)
Holub Industries Inc 442 Elm St Sycamore Ill (1-8)
Husky Products Inc 5300 Vine St Cincinnati 17 Ohio (6)
●IDEAL INDUSTRIES INC 5136 Park Ave Sycamore Ill (8)—ADV PG 88-89
Ilsco Corp 4730 Madison Rd Cincinnati 27 Ohio (1-7)
Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 Ill (1-6)
Joy Mfg Co H W Oliver Bldg Pittsburgh 22 Pa (1-5-6)
Joy Mfg Co Electrical Products Div 1201 Macklind Ave St Louis 10 Mo (1-3-5)
Kearney (James R) Corp 4236 Clayton Ave St Louis 10 Mo (1)
Kolton Electric Mfg Co 123 New Jersey Railroad Ave Newark 5 NJ (1-4-7)
Krueger & Hudepohl Inc 1041 Evans St Cincinnati 4 Ohio (1-4)
Kulka Electric Corp 633 S Fulton Ave Mount Vernon NY (1-4-7)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (1-6)
Lint (Clyde W) 2323 W 18 St Chicago 8 Ill (1)
M & W Electric Mfg Co Inc S Walnut St (P O Box 87) East Palestine Ohio (10)
Madison Equipment Co 5405 Detroit Ave Cleveland 2 Ohio (8)

Marathon Special Products Corp 12th & Cranberry Sts Erie Pa (7)
Marshall (John) Associates Inc Box 2463 Bridgeport 8 Conn (1)
Mend-It Sleeve Mfg Co 3125 Gloria Terrace Lafayette Calif (1)
Metalectrics Inc 677 Broadway NY 12 NY (1-8)
Midwest Electric Mfg Co 1639 Walnut St Chicago 12 Ill (10)
Minnesota Mining and Mfg Co Electrical Products Div 900 Bush Ave St Paul 6 Minn (1-6)
●O Z ELECTRICAL MFG CO INC 262 Bond St Brooklyn 17 NY (1-4-10-14)—ADV PG 109
Ohio Brass Co 380 N Main St Mansfield Ohio (5)
Okonite Co Passaic NJ (6)
●PLM PRODUCTS INC 3871 W 150 St Cleveland 11 Ohio (5-6)—ADV PG 122
Pekcu Co 1227 McDonald Ave Brooklyn 30 NY (1-6)
Penn-Union Electric Corp 315 State St Erie Pa (1-2-4-6-7-10-14)
Porcelain Products Co 224 N Patterson St Carey Ohio (2-10)
Preformed Line Products Co 5349 St Clair Ave Cleveland 3 Ohio (6)
Rattan Mfg Co 10 Wall St (P O Box 1745) New Haven 7 Conn (1)
Red Seal Electric Co 10307 Detroit Ave Cleveland 2 Ohio (3)
Richards Mfg Co Ltd 25 Rankin St Newark 3 NJ (1-4-6)
Ringsdorff Carbon Corp Box 22 McKeesport Pa (9)
Rusgreen Mfg Co 14262 Birwood Ave Detroit 38 Mich (1-4-5-6)
Sherman (H B) Mfg Co 22 Barney Battle Creek Mich (1)
Southern Electrical Equipment Co 308 W Bland at Mint St Charlotte 3 NC (1)
Standard Electric Time Co 89 Logan St Springfield 2 Mass (7)
Star-A Electric Mfg Co Inc 269 Meserole St Brooklyn 6 NY (8)
States Co 19 New Park Ave Hartford 6 Conn (7)
Superior Electric Co 83 Laurel St Bristol Conn (7)
Surprenant Mfg Co 199 Washington St Boston 8 Mass (3)
Suttle Equipment Corp 135 S LaSalle St Chicago 3 Ill (7)
●THOMAS & BETTS CO 36 Butler St Elizabeth 1 NJ (1-4-6-8)—ADV PG 119
Vaco Products Co 317 E Ontario St Chicago 11 Ill (7)
Wama Co Industrial Bldg Baltimore 2 Md (7)
Watteredge Co 19629 West Lake Rd Rocky River 16 Ohio (4)
Weaver (J A) Co 2110 Howard St St Louis 6 Mo (1)
Yorkville Metal Products Co 677 Broadway NY 12 NY (1-8)

6G. CONDUCTOR SUPPORTS

1. **Bushing insulators & wireholders**
2. **Open wiring cleats, knobs & tubes**
3. **Hangers & grips**
4. **Racks, framing & ladders**
5. **Staples, clamps, clips & straps**
6. **Trays**
7. **Troughs**
8. **Drive & bridle rings**
9. **Cable ties**
10. **Cable spacers**

Accessories for holding wire and cable in place from source to load. See also "Raceways."

Adalet Mfg Co 14300 Lorain Ave Cleveland 11 Ohio (1)
Allis-Chalmers Mfg Co 930 S 70 St Milwaukee 1 Wis (1)
American Steel & Iron Works 5801 S Lowe Ave Chicago 21 Ill (4)
Anderson Electric Corp P O Drawer 2151 Birmingham 1 Ala (5)
Arrow Fastener Co Inc 1 Junius St Brooklyn 12 NY (5)
Atlas Tack Corp Pleasant & South Sts Fairhaven Mass (5)
●BLACKHAWK INDUSTRIES 250 S Main St Dubuque Iowa (1)—ADV PG 94
Buchanan Electrical Products Corp 434 U S Route 22 Hillside NJ (5)
Cable Electric Products Inc 234 Daboll St Providence 7 RI (5)
Capson Mfg Co 2565 W Fullerton Ave Chicago 47 Ill (5)
Central Porcelain Co 507 Railroad St Columbiana Ohio (2)
●CHALFANT PRODUCTS CO INC 11525 Madison Ave Cleveland 2 Ohio (4-6-7)—ADV PG 136
Cope (T J) Div Rome Cable Corp Third & Walnut Sts Collegeville 5 Pa (4-7)
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill (2-3-6-7)
●EFFICIENCY ELECTRIC & MFG CO Park Ave Ext P O Box 30 East Palestine Ohio (1-2-4)—ADV PG 112-116
Electrovert Inc 124 E 40 St New York 16 NY (5-9)
Eliza Metal Products Co Box 408 Bridgeville Pa (7)
Elliott Electric Products Co 1513 Olmstead Ave New York 62 NY (1)
Erico Products Inc 2070 E 61 Pl Cleveland 3 Ohio (5)
Fasform Div Heller Roberts Mfg Corp 6115 Carnegie Ave Cleveland 1 Ohio (8)
Fullman Mfg Co 1209-1215 Jefferson St Latrobe Pa (5)
G-C Electronics Co 400 S Wyman St Rockford Ill (5)
General Metals Inc 858 Goldsbro Greensboro NC (7)
Glastic Corp 4321 Glenridge Rd Cleveland 21 Ohio (1)
Handy Angle Div Lug-All Co 355 Lancaster Ave Haverford Pa (4)
Hendrix Wire & Cable Corp Milford NH (10)
Heyman Mfg Co Kenilworth 20 NJ (1)
●HOFFFMAN ENGINEERING CORP 1050 Tyler St Anoka Minn (7)—ADV PG 122-134
Holub Industries Inc 442 Elm St Sycamore Ill (5)
Husky Products Inc 5300 Vine St Cincinnati 17 Ohio (3-4-5-6-7)
Johns-Manville 22 E 40 St New York 16 NY (6)
Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 Ill (1)
Kellems Co Inc 15 Williams St Stonington Conn (3)
●Keystone Mfg Co 23328 Sherwood Rd Warren Mich (7)—ADV PG 133
Knox Porcelain Corp 2706 Mynders Ave (P O Box 2031) Knoxville 1 Tenn (2)
Liebfried (H) Mfg Corp 95-101 Guernsey St Brooklyn 22 NY (3-4)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (4)
Lint (Clyde W) 2323 W 18 St Chicago 8 Ill (2)
M & T Welding Products Corp 703 37th Ave Oakland Calif (4)
M & W Electric Mfg Co Inc S Walnut St (P O Box 87) East Palestine Ohio (4)
Madison Equipment Co 5405 Detroit Ave Cleveland 2 Ohio (8)
Metalectrics Inc 677 Broadway NY 12 NY (1)
Midwest Electric Mfg Co 1639 Walnut St Chicago 12 Ill (5)
●MINERALLAC ELECTRIC CO 25 N Peoria St Chicago 7 Ill (1)—ADV PG 124-128-136-139
●O Z ELECTRICAL MFG CO INC 262 Bond St Brooklyn 17 NY (1)—ADV PG 109
PLM Products Inc 3871 W 150 St Cleveland 11 Ohio (10)
P-W Industries Inc 11200 Roosevelt Blvd Philadelphia 15 Pa (4-7)
●PAINE CO Fullerton Ave & Westgate Rd Addison Ill (5)—ADV PG 120
Palmer Electric & Mfg Co 24 Water St Wakefield Mass (7)
Porcelain Products Co 224 N Patterson St Carey Ohio (2)
Preformed Line Products Co 5349 St Clair Ave Cleveland 3 Ohio (10)
Queen Products Co Inc Thirteenth & Rowan Sts Louisville 3 Ky (7)
Ralco Mfg Co 123-141 N Albany Ave Chicago 12 Ill (3)
Red Seal Electric Co 10307 Detroit Ave Cleveland 2 Ohio (1)
Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa (2)
Rome Cable Div Aluminum Co of America 421 Ridge St Rome NY
Rusgreen Mfg Co 14262 Birwood Ave Detroit 38 Mich (5)
Russell & Stoll Co Inc 125 Barclay St NY 7 NY (1)
Seeger-Williams Inc 4 Norman St Bridgeport 5 Conn (5)
Spring City Electrical Mfg Co Spring City 85 Pa (1)
Steel City Electric Co 1207 Columbus Ave Pittsburgh 33 Pa (1-2-3-4-5)
Superior Porcelain Co 931½ Market St Parkersburg W Va (2)
Superior Staple Mfg Co 40 Commercial St Fitchburg Mass (5)
TA Mfg Corp 4607 Alger St Los Angeles 39 Calif (1)
●THIEL TOOL & ENGINEERING CO 1417 N Market St St Louis 6 Mo (5)—ADV PG 138
Thomas & Betts Co Inc 36 Butler St Elizabeth 1 NJ (9)
Titchener (E H) & Co 67 Clinton St Binghamton NY (5)
Unistrut Products Co 933 Washington Blvd Chicago 7 Ill (4)
Wadsworth Electric Mfg Co Inc 20-34 W 11 St (Box 272) Covington Ky (7)

6H. BUSBAR & SUPPORTS

For switchboards, substations and similar applications. For enclosed busbar see "Busways."

Aluminum Co of America 1501 Alcoa Bldg Pittsburgh 19 Pa
Anderson Electric Corp P O Drawer 2151 Birmingham 1 Ala
Burndy Corp Norwalk Conn
Chase Brass & Copper Co Inc 236 Grand St Waterbury 20 Conn
Dossert Mfg Corp 249-255 Huron St Brooklyn 22 NY
Electric Materials Co Box 390 North East Pa
Erico Products Inc 2070 E 61 Pl Cleveland 3 Ohio
General Electric Co Apparatus Sales Div Schenectady 5 NY
Memco Engineering & Mfg Co Inc Commack LI NY
O Z Electrical Mfg Co Inc 262 Bond St Brooklyn 17 NY
Penn-Union Electric Corp 315 State St Erie Pa
Powercraft Corp 2215 De Kalb St St Louis 4 Mo
Red Seal Electric Co 10307 Detroit Ave Cleveland 2 Ohio
Revere Copper & Brass Inc 230 Park Ave NY 17 NY
Rusgreen Mfg Co 14262 Birwood Ave Detroit 38 Mich
Southern Electrical Equipment Co 308 W Bland at Mint St Charlotte 3 NC
Young Electric & Mfg Co Inc 2134 Curtis Denver 2 Colo

TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers* on the Free Information cards elsewhere in this issue.

*Code No.	Description, Pages Catalog No. & Mfr.
6-1	Wire & Cable; 34p (Alpha Wire)
6-2	Connectors; 7p; Cat. No. 48D (Anderson)
6-3	Flexible Cords, Wires & Cables; 8p (Apex)
6-4	Electrical Connectors, Blocks, Fittings; 7p; Cat. No. 85 (Buchanan)
6-5	Solderless Connectors; 8p; Cat. No. 85 (Buchanan)
6-6	Electrical Connectors; 96p; Cat. No. 60 (Burndy)
6-7	Electrical Connections; 18p; Cat. No. TH-9 (Burndy)
6-8	Equipment For Underground Systems; 104p; Cat. No. z-47 (Burndy)
6-9	Welding Cables; 2p; Cat. No. PP-3 (General Cable)
6-10	Power Cables; Cat. No. WC-8099 (General Electric)
6-11	Varnished Cable; Cat. No. WC-8319 (General Electric)
6-12	Insulated Wire; 42p (Hitemp)
6-13	Electrical & Mechanical Products; 41p; Cat. No. 16 (Holub)
6-14	Connectors for Equipment Control; 12p; Cat. No. 372 (Joy)
6-15	Clips and Insulators; Cat. No. 220 (Mueller Electric)
6-16	Armored Power Cables; 11p; Cat. No. RCP-730 (Rome)
6-17	Corona-level Measurements on Insulated Cables; 11p; Cat. No. RCT-711 (Rome)
6-18	Distribution Systems; 19p; Cat. No. RCP-791 (Rome)
6-19	Effects of D-C Tests in Cable Insulations; 2p; Cat. No. RCT-712 (Rome)
6-20	Minimizing Failures In Airport Lighting Cables; 3p; Cat. No. RCT-600 (Rome)
6-21	Polyethylene for Wire & Cable; 10p; Cat. No. RCT-710 (Rome)
6-22	Polyethylenes for Higher Voltage Cables; 7p; Cat. No. 700 (Rome)
6-23	Wire & Wiring System Standards; 3p; Cat. No. RCT-103 (Rome)

SECTION 7. RACEWAY AND FITTINGS

Raceway tools are listed in Section 12. Trays and troughs and other conductor supports are listed in Section 6.

7A. AUXILIARY GUTTERS

For increasing size of cabinets and panels to provide additional wiring room.

Adam (Frank) Electric Co 3647 Windsor Pl St Louis Mo
Alwalt Mfg Co 1706 Lapham Dr Modesto Calif
Burns (James F) Co 1601 Industrial Highway Pennsauken NJ
Delta-Star Electric Div K Porter Co Inc 2437 Fulton St Chicago 12 Ill
General Metals Inc 858 Goldsbro Greensboro NC
Hoffman Engineering Corp 1050 Tyler St Anoka Minn
Keyst ne Mfg Co 23328 Sherwood Rd Warren Mich
National Electric Div K Porter Co Inc Porter Bldg Pittsburgh 19 Pa
Parker Electrical Mfg Co 221 Washington St Oakland 7 Calif
Queen Products Co Inc Thirteenth & Rowan Sts Louisville 3 Ky
Square D Co 6060 Rivard St Detroit 11 Mich
Sun Electric Products Inc 28 S Day St Orange NJ
Wadsworth Electric Mfg Co Inc 20-34 W 11th St (Box 272) Covington Ky
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa—ADV PG 2nd COVER
Young Electric & Mfg Co Inc 2134 Curtis Denver 2 Colo
Zinsco Electrical Products 729 Turner Los Angeles 12 Calif

7B. BUSWAY

1. **Low-impedance feeder**
2. **Plug-in**
3. **Current-limiting**
4. **Trolley duct**
5. **Excitation**
6. **High frequency**

Metal-enclosed busbars for exposed wiring installation. Trolley type incorporates bus or conductors accessible to sliding shoes or connectors for power feed.

Adam (Frank) Electric Co 3647 Windsor Pl St Louis Mo (1-2)
BullDog Electric Products Div I-T-E Circuit Breaker Co 7610 Joseph Campau Detroit Mich (1-2-4)
Calvert Co 19851 Ingersoll Dr Rocky River 16 Ohio (1)
Continental Electric Equipment Co Box 1055 Cincinnati 1 Ohio (1-2)
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill (4)
Electric Distribution Products Inc 2200 31st St S W Allentown Pa (1-2)
Federal Pacific Electric Co 50 Paris St Newark 5 NJ (2-3-4)
Feedrail Corp 125 Barclay St New York 7 NY (4)
General Electric Co Distribution Assemblies Dept 41 Woodford Ave Plainville Conn (1-2-3-4)
Insul-8-Corp 1369 Industrial Rd San Carlos Calif (1-2-4)
National Electric Div H K Porter Co Inc Porter Bldg Pittsburgh 19 Pa (1-2)
Ringsdorff Carbon Corp Box 22 East McKeesport Pa (4)
Square D Co 6060 Rivard St Detroit 11 Mich (1-2-3)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1-2-3)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (5)
Westinghouse Electric Corp Standard Control Div Beaver Pa (1-2-3-5-6)
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1-2-3)—ADV PG 2nd COVER
Young Electric & Mfg Co Inc 2134 Curtis Denver 2 Colo (1)
Zinsco Electrical Products 729 Turner Los Angeles 12 Calif (1-2)

7C. CELLULAR FLOOR RACEWAY SYSTEMS

1. **Metallic**
2. **Non-metallic**
3. **Concrete**
4. **Complete adjustable floors**

Systems which permit use of structural materials for enclosing electrical conductors.

Ceco Steel Products Corp 5601 W 26 St Chicago 50 Ill (1)
Conduflor Corp 13560 Lorain Ave (P O Box 2748) Cleveland 11 Ohio (1-3)
General Electric Co Construction Materials Div Conduit Products Dept 1285 Boston Ave Bridgeport 2 Conn (1)
Howard Electric Co 1950 Ruby St Melrose Park Ill (1)
National Electric Div H K Porter Co Inc Porter Bldg Pittsburgh 19 Pa (1)
Unistrut Products Co 933 Washington Blvd Chicago 7 Ill (4)
Walker Brothers End St Conshohocken Pa (1)

7D. CONDUIT & DUCT

1. **Aluminum**
2. **Asbestos-cement**
3. **Clay**
4. **Fiber**
5. **Steel**
6. **Steel, plastic-coated**
7. **Wrought iron**
8. **Soapstone**
9. **Plastic**
10. **Alloy**

For protection of conductors between source and load. For accessories, see "Conduit Fittings."

Aluminum Co of America 1501 Alcoa Bldg Pittsburgh 19 Pa (1)
American Hard Rubber Co Ace Rd Butler NJ (9)
American Metal Moulding Co 146 Colt St Irvington NJ (6)
Brown Co 150 Causeway St Boston Mass (4)
Busada Mfg Corp 32-21 Downing St Flushing 54 NY (9)
Byers Co Clark Bldg Pittsburgh 30 Pa (7-9)
Carlon Products Corp P O Box 133 Aurora Ohio (9)
Chesflex Corp 684 Nepperhan Ave Yonkers NY (9)
Clifton Conduit Corp 3300 Eastbourne Ave Baltimore 24 Md (5)
Crescent Plastics Inc 955 Diamond Ave Evansville 7 Ind (9)
Electric Hose & Rubber Co 12th & Dure Sts Wilmington Dela (9)
General Electric Co Construction Materials Div Conduit Products Dept 1285 Boston Ave Bridgeport 2 Conn (5-6)
●GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (5)—ADV PG 2
Industrial Plastic Fittings Co 3891 W 150 St Cleveland 11 Ohio (9)
●JOHNS-MANVILLE 22 E 40 St New York 16 NY (2)—ADV PG 130
Kyova Fibre Pipe Co Ironton Ohio (4)
Laclede Steel Co Arcade Bldg St Louis 1 Mo (5)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (4)
Mark (Clayton) & Co 1900 Dempster St Evanston Ill (5)
Natco Corp 327 Fifth Ave Pittsburgh 22 Pa (3)
National Electric Div H K Porter Co Inc Porter Bldg Pittsburgh 19 Pa (5)
National Supply Co Tubular Div Two Gateway Center (P O Box 416) Pittsburgh 30 Pa (5)
Orangeburg Mfg Co 375 Park Ave New York 22 NY (4)
Perma-Pipe Corp P O Box 525 Middleboro Ky (9)
Pittsburgh Reflector Co Oliver Bldg Mellon Square Pittsburgh 22 Pa (5)
Pittsburgh Standard Conduit Co 61 Bridge St Pittsburgh 23 Pa (5)
Plastilline Inc 2 Intervale St White Plains NY (9)
Republic Steel Corp Steel And Tubes Div 224 E 131 St Cleveland 8 Ohio (5-6)
Reynolds Metals Co Richmond 18 Va (1)
●ROME CABLE DIV Aluminum Co of America 421 Ridge St Rome NY (1-5)—ADV PG 74-75
Soanstone Duct Co 3985 Beach St Oakland Calif (8)
Southwestern Plastic Pipe Co 5763.5-NQ Mineral Wells Tex (9)
●STEELDUCT CO Republic Steel Bldg Youngstown Ohio (5)—ADV PG 111
●TRIANGLE CONDUIT & CABLE CO INC TRIANGLE & Jersey Aves New Brunswick NJ (4-5)—ADV PG 3rd COVER
United States Rubber Co Naugatuck Chemical Div 946K Elm St Naugatuck Conn (9)
Walker Brothers End St Conshohocken Pa (5)
Western Plastics Corp 1515 W Second St Hastings Neb (9)
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (5)—ADV PG 2nd COVER
Wheatland Electric Products Co 7308 Church Ave Pittsburgh 2 Pa (5)
Youngstown Sheet and Tube Co P O Box 900 Youngstown 1 Ohio (5-10)

7E. CONDUIT & EMT FITTINGS

1. **Connectors**
2. **Bushings, couplings & locknuts**
3. **Bushing adapters**
4. **Conduit bodies & covers**
5. **Elbows & goosenecks**
6. **Pulling elbows & adapters**
7. **Expansion fittings**
8. **Gaskets**
9. **Hangers, straps, clamps & supports**
10. **Markers**
11. **Nipples & running thread**
12. **Seals, sealing plugs & compound**
13. **Service entrance masts, heads & fittings**
14. **Thread guards**
15. **Conduit ventilators**
16. **Deflection fittings**
17. **Enlargers**
18. **Plastic fittings**
19. **Flex metallic conduit fittings**
20. **Aluminum fittings**

Accessories used to join, seal or terminate conuit and electric metallic tubing. See also "Boxes."

Acme Mfg & Gasket Co 738 N 41 St Phila 4 Pa (8)
Adalet Mfg Co 14300 Lorain Ave Cleveland 11 Ohio (2-7-9-12-13)
●ALL-STEEL EQUIPMENT INC Aurora Ill 1-2-13)—ADV PG 73
Allen-Stevens Conduit Fittings Corp 33-53 62nd St Woodside 77 NY (1-2-3-7-13)
Apex Bolt Products Co 452-458 No Claremont Ave Chicago 12 Ill (9)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 Ill (1-2-3-4-9-11-12-13)
●ARROLET CORP Foot of Bower St Montgomery Pa (2-3-4-8)—ADV PG 136
Associated Manufacturers & Distributors Corp 5015 S E Haig St Portland 6 Ore (1-11)
Badger Die Casting Corp 201 W Oklahoma Ave Milwaukee 7 Wis (1)
●BLACKHAWK INDUSTRIES 250 S Main St Dubuque Iowa (1 thru 4-9-12-13)—ADV PG 94
Bowers Mfg Co Inc 6700 Avalon Blvd Los Angeles 3 Calif (9)
Brady (WH) Co 727 W Glendale Ave Milwaukee 9 Wis (10)
●BRIEGEL METHOD TOOL CO 104 NE First St Galva Ill (1-2)—ADV PG 102
Brown Company 150 Causeway St Boston 14 Mass (1-5-17)
Buchanan Electrical Products Corp 434 US Route 22 Hillside NJ (2)
Burndy Corp Norwalk Conn (1)
Clifton Conduit Corp 3300 Eastbourne Ave Baltimore 24 Md (2-5-11)
Conduit Fittings Corp 6400 W 66th St Chicago 38 Ill (1-2-5-9-11-13)
Conduit Nipple Mfg Co 1455 Spring Garden Ave Pittsburgh 12 Pa (2-5-11)
●CONDUIT PIPE PRODUCTS CO 157 W Fulton St Columbus 16 Ohio (2-5-11-20)—ADV PG 96
Crescent Plastics Inc 955 Diamond Ave Evansville 7 Ind (18)
Crouse-Hinds Co Syracuse 1 NY (1 thru 9-12-13)
Diamond Expansion Bolt Co Inc Garwood NJ (9)
Duro Fittings Co 2210 S Davie Ave Los Angeles 22 Calif (1-2-4-5-9-11-12-13-19)
Earl Electric Mfg Corp 35-20 Borden Ave Long Island City NY (1-2-9)
●EFFICIENCY ELECTRIC & MFG CO Park Ave Ext P O Box 30 East Palestine Ohio (9)—ADV PG 112-116
Electric Tube Products 74-16 Grand Ave Maspeth NY (1-2-11)
Electrical Fittings Corp 37-50 57th St Woodside 77 NY (1-2-4-5-8-9-11-12-13-19)
Electroline Mfg Co 2622 E 51st St Cleveland 4 Ohio (1-2)
Elliott Electric Products Co 1513 Olmstead Ave New York 62 NY (1-9-11-12-13-14)
Erico Products Inc 2070 E 61 Pl Cleveland 3 Ohio (9)
Fastway Fasteners Inc 1676 E 28 St Lorain Ohio (9)
●FULLMAN MFG CO 1209-1215 Jefferson St Latrobe Pa (9)—ADV PG 118-120
Gateway Engineering Co 3233 W Grand Ave Chicago 51 Ill (9)
Gedney Electric Co Americas Bldg Radio City NY 20 NY (1 thru 6-8-9-11-12-13-14)
General Steel Fittings Co 1321 21st St Racine Wis (2-11)
●GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (1 thru 14)—ADV PG 2
Grinnell Co Inc 260 W Exchange St Providence 2 RI (9)
Halex Die Casting Co 8640 Bessemer Cleveland 27 Ohio (1-2)
Holub Industries Inc 442 Elm St Sycamore Ill (9)
●IDEAL INDUSTRIES INC 5136 Park Ave Sycamore Ill (5)—ADV PG 88-89
Ideal-Simplet Fittings Inc 5136 Park Ave Sycamore Ill (4-5-8-9)

Johns-Manville 22 E 40 St New York 16 NY (12)
Kaiser Aluminum & Chemical Sales Inc Kaiser Center 300 Lake Side Drive Oakland 12 Calif (1-2-5)
Kees (F D) Mfg Co 700 Park Ave Beatrice Neb (2)
●KILLARK ELECTRIC MFG CO 3940 Easton Ave St Louis 13 Mo (1-2-3-4-5-8-12-13-17)—ADV PG 86-87
Kondu Corp 1040 W 12 St Erie Pa (1-2-4-5)
Korns (C C) Co P O Box 483 Johnstown Pa (9)
Leibfried (C H) Mfg Corp 95-101 Guernsey St Brooklyn 22 NY (9)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (5-11-12)
Lint (Clyde W) 2323 W 18 St Chicago 8 Ill (9-12-13)
M & T Welding Products Corp 703 37th Ave Oakland Calif (13)
M & W Electric Mfg Co Inc S Walnut St (P O Box 87) East Palestine Ohio (1-9-12-13)
Madison Equipment Co 5405 Detroit Ave Cleveland 2 Ohio (1-2-3-9)
Marco Industries 207 S Helena St Anaheim Calif (2)
Mark (Clayton) & Co 1900 Dempster St Evanston Ill (2-5)
Mason (L E) Co 98 Business St (Hyde Park) Boston 36 Mass (4-5-8-13)
●McCAFFREY MFG & SUPPLY CO 1840 W 14 St Chicago 8 Ill (13)—ADV PG 137
McKinley (Ben P) Co 522 S Clinton St Chicago 7 Ill (2)
Merwin Mfg Co 19th & German Sts Erie Pa (9)
Metalectrics Inc 677 Broadway NY 12 NY (1 thru 5-9-11-12-13-17)
Metro Casting Co Inc 47 Grattan St Brooklyn 37 NY (1-2)
Midwest Electric Mfg Co 1639 Walnut St Chicago 12 Ill (2-5-9-11-13)
●MINERALLAC ELECTRIC CO 25 N Peoria St Chicago 7 Ill (9-12)—ADV PG 124-128-136-139
●MISENER MFG CO INC 202-208 Walton St Syracuse 2 NY (12)—ADV PG 140
Mult-A-Frame Div Ainsworth Precision Castings Co 1471-77 E Atwater St Detroit 7 Mich (9)
National Electric Div H K Porter Co Inc Porter Bldg Pittsburgh 19 Pa (1-2-5)
National Supply Co Tubular Div Two Gateway Center (P O Box 416) Pittsburgh 30 Pa (2-5)
●O Z ELECTRICAL MFG CO INC 262 Bond St Brooklyn 17 NY (2-7-12)—ADV PG 109
●PLM PRODUCTS INC 3871 W 150 St Cleveland 11 Ohio (1-2-15)—ADV PG 122
●PAINE CO Fullerton Ave & Westgate Rd Addison Ill (9)—ADV PG 120
Pipe Couplings Mfrs Inc P O Box 488 Martins Ferry Ohio (2-5-11)
Pittsburgh Reflector Co Oliver Bldg Mellon Square Pittsburgh 22 Pa (9)
Pittsburgh Standard Conduit Co 61 Bridge St Pittsburgh 23 Pa (2-5-11)
Plastiline Inc 2 Intervale St White Plains NY (14)
Porcelain Products Co 224 N Patterson St Carey Ohio (13)
Pyle-National Co 1344 N Kostner Ave Chicago 51 Ill (1-2-3-4-5-9-12-13)
Ramco Mfg Co 540 Westfield Ave W Roselle Park NJ (9)
Rattan Mfg Co 10 Wall St (P O Box 1745) New Haven 7 Conn (1-2-5-9-11-13)
Raybestos-Manhattan Inc 61 Willett St Passaic NJ (8)
Red Seal Electric Co 10307 Detroit Ave Cleveland 2 Ohio (2-12)
Republic Steel Corp Steel And Tubes Div 224 E 131 St Cleveland 8 Ohio (2-5)
Reynolds Metals Co Richmond 18 Va (2)
Richards (J R) Co P O Box 482 Carnegie Pa (1-2-9-11-12-13)
Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa (2)
Roller (Wm G) Inc 159 Liberty Ave Mineola NY (1-2-11-12-13)
Rusgreen Mfg Co 14262 Birwood Ave Detroit 38 Mich (9)
Russell & Stoll Co Inc 125 Barclay St NY 7 NY (5-12)
Sloane Mfg Co 7606 N Clybourn Ave Sun Valley Calif (18)
So-Cal Electro Products Inc 4423 W Jefferson Blvd Los Angeles 16 Calif (1)
●SPRING CITY ELECTRICAL MFG CO Spring City 85 Pa (2-7-16-18)—ADV PG 141-144
●STEEL CITY ELECTRIC CO 1207 Columbus Ave Pittsburgh 33 Pa (1-2-3-6-9-13)—ADV PG 131
Steel Electric Products Co Inc 5602 18th Ave Brooklyn 4 NY (1 thru 6-8-9-11-12-13-17)
●STEELDUCT CO Republic Steel Bldg Youngstown Ohio (2-5-11)—ADV PG 111
TA Mfg Corp 4607 Alger St Los Angeles 39 Calif (9)
Thepitt Mfg Co Gregg & Hammond Sts Carnegie Pa (2-3-9-11-12-13)
●THIEL TOOL & ENGINEERING CO 1417 N Market St St Louis 6 Mo (9)—ADV PG 138
Thomas & Betts Co 36 Butler St Elizabeth 1 NJ (1 thru 6-9-11-13-19)
Thompson Mfg Co 611 Stevens St Geneva Ill (9)
Tomic Sales & Engineering Co 20000 Sherwood Ave Detroit 34 Mich (1-2-19)
Union Insulating Co Inc Box 351 Parkersburg W Va (2)
Unistrut Products Co 933 Washington Blvd Chicago 7 Ill (9)
Utility Service Co Inc 1620 13th St (P O Box 102) Racine Wis (13)
VV Fitting Co P O Box 1253 Merchantville NJ (2-7-9-13)
Victor Specialties 775 Main St New Rochelle NY (9)
Walker Brothers End St Conshohocken Pa (2-5)
●WEAVER (J A) CO 2110 Howard St St Louis Mo (1-2-5-9-13)—ADV PG 143
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1 thru 5-7 thru 14)—ADV PG 2nd COVER
Yorkville Metal Products Co 677 Broadway NY 12 NY (2-9-11-12-17)
Youngstown Sheet and Tube Co P O Box 900 Youngstown 1 Ohio (2-5)

7F. ELECTRICAL METALLIC TUBING

1. Steel
2. Steel, plastic coated
3. Aluminum

Lightweight conduit; frequently called "EMT or "Thinwall"

Aluminum Co of America 1501 Alcoa Bldg Pittsburgh 19 Pa (3)
Circle Wire & Cable Corp 5500 Maspeth Ave Maspeth NY (1)
Clifton Conduit Corp 3300 Eastbourne Ave Baltimore 24 Md (1)
Columbia Cable & Electric Corp 255 Chestnut St Brooklyn 8 NY (1)
General Electric Co Construction Materials Div Conduit Products Dept 1285 Boston Ave Bridgeport 2 Conn (1-2)
Laclede Steel Co Arcade Bldg St Louis 1 Mo (1)
Mark (Clayton) & Co 1900 Dempster St Evanston Ill (1)
National Electric Div H K Porter Co Inc Porter Bldg Pittsburgh 19 Pa (1)
National Supply Co Tubular Div Two Gateway Center (P O Box 416) Pittsburgh 30 Pa (1)
Nikoh Tube Co 5000 S Whipple St Chicago 32 Ill (1)
Pittsburgh Standard Conduit Co 61 Bridge St Pittsburgh 2 Pa (1)
Republic Steel Corp Steel And Tubes Div 224 E 131 St Cleveland 8 Ohio (1-2)
Rome Cable Div Aluminum Co of America 421 Ridge St Rome NY (1-3)
Steelduct Co Republic Steel Bldg Youngstown Ohio (1)
●TRIANGLE CONDUIT & CABLE CO INC Triangle & Jersey Aves New Brunswick NJ (1)—ADV PG 3rd COVER
Walker Brothers End St Conshohocken Pa (1)
Wheatland Electric Products Co 7308 Church Ave Pittsburgh 2 Pa (1)
Youngstown Sheet and Tube Co P O Box 900 Youngstown 1 Ohio (1)

7G. FLEXIBLE METALLIC CONDUIT

1. Standard
2. Liquid-tight

Spirally wound steel strip, interlocked to provide flexible enclosure for conductors.

American Metal Moulding Co 146 Colt St Irvington NJ (1-2)
●ANACONDA METAL HOSE DIV American Brass Co P O Box 791 Waterbury 20 Conn (12)—ADV PG 1
Clifton Conduit Corp 3300 Eastbourne Ave Baltimore 24 Md (1)
Columbia Cable & Electric Corp 255 Chestnut St Brooklyn 8 NY (1-2)
Electri-Flex Co Roselle Ill (2)
Ettco Wire & Cable Corp 75 Onderdonk Ave Brooklyn 37 NY (1)
Flexonics Corp 1430 S Third Ave Maywood Ill (1-2)
Gedney Electric Co Americas Bldg Radio City NY 20 NY (1-2)
Graybar Electric Co Inc 420 Lexington Ave NY 17 NY (1)
●INTERNATIONAL METAL HOSE CO Ashford Ave Bellevue Ohio (1-2)—ADV PG 137
Kopex Div Gemmer Mfg Co 6400 Mt Elliott Ave Detroit Mich (1)
Marco Industries 207 S Helena St Anaheim Calif (1)
National Electric Div H K Porter Co Inc Porter Bldg Pittsburgh 19 Pa (1)
Thepitt Mfg Co Gregg & Hammond Sts Carnegie Pa (1)
Universal Metal Hose Co 2133 S Kedzie Ave Chicago 23 Ill (1-2)
Wagner Malleable Products Co 222 W Adams St Chicago 6 Ill (1)

7H. SURFACE RACEWAY

1. Metallic
2. Non-metallic
3. Ground wire moulding
4. Combination raceway & fixture support
5. Combination raceway & multi-outlet system
6. Overfloor duct

For extension of existing concealed wiring, or for complete installation where concealed wiring is unnecessary or impractical.

Haley (P G) & Co Inc 767 Spitzer Bldg Toledo 4 Ohio (3)
Hendrix Wire & Cable Corp Milford NH (3)
Mitchell Moulding Co 1501 Circle Ave Forest Park Ill (3)
National Electric Div H K Porter Co Inc Porter Bldg Pittsburgh 19 Pa (1-5)
Saylor Electric Products Corp 277 Pierce St Birmingham Mich (2)
●STEEL CITY ELECTRIC CO 1207 Columbus Ave Pittsburgh 33 Pa (1-4)—ADV PG 131
Versabar Corp 14 Whyte St Jersey City NJ (1)
Wadsworth Electric Mfg Co Inc 20-34 W 11th St (Box 272) Covington Ky (1)
●WIREMOLD CO Hartford 10 Conn (1-5-6)—ADV PG 125

7K. UNDERFLOOR DUCT AND DISTRIBUTION SYSTEMS

For concealed passage of conductors beneath floor. For structurally-integrated systems, see "Cellular Floor Raceways."

Gateway Engineering Co 3233 W Grand Ave Chicago 51 Ill
General Electric Co Construction Materials Div Conduit Products Dept 1285 Boston Ave Bridgeport 2 Conn
Howard Electric Co 1950 Ruby St Melrose Park Ill
National Electric Div H K Porter Co Inc Porter Bldg Pittsburgh 19 Pa
National Supply Co Tubular Div Two Gateway Center (P O Box 416) Pittsburgh 30 Pa
Orangeburg Mfg Co 375 Park Ave New York 22 NY
Walker Bros End St Conshohocken Pa
Wheatland Electric Products Co 7308 Church Ave Pittsburgh 2 Pa

7L. WIREWAY

Covered troughs for continuous enclosure of conductors.

Alwalt Mfg Co 1706 Lapham Dr Modesto Calif
Columbia Metal Box Co 260 E 143 St NY 51 NY
Eliza Metal Products Co Box 408 Bridgeville Pa
Federal Pacific Electric Co 50 Paris St Newark 5, NJ
General Electric Co Distribution Assemblies Dept 41 Woodford Ave Plainville Conn (7L)
General Metals Inc 858 Goldsboro Greensboro NC
●HOFFMAN ENGINEERING CORP 1050 Tyler St Anoka Minn—ADV PG 122-134
●HUENEFELD CO Engineered Products Div 2701 Spring Grove Ave Cincinnati 25, Ohio—ADV PG 115
●KEYSTONE MFG CO 23328 Sherwood Rd Warren Mich—ADV PG 133-139
Mecod Metal Box & Panel Mfg Co Inc 2522 W Huntington St Phila 32 Pa
National Electric Div H K Porter Co Inc Porter Bldg Pittsburgh 19 Pa (7L)
Queen Products Co Inc Thirteenth & Rowan Sts Louisville 3 Ky
Taylor Electric Inc 15400 Dale Detroit 23 Mich

TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers* on the Free Information cards elsewhere in this issue.

*Code No.	Description, Pages Catalog No. & Mfr.
7-1	Electrical Fittings; 11p; Cat. No. 6159 (Allen-Stevens)
7-2	Cable Baskets; 5p; Cat. No. 258 (Chalfant)
7-3	Cable Trays; 7p; Cat. No. Series 1 (Chalfant)
7-4	Underfloor Distribution Systems; 6p (Conduflor)
7-5	Fittings; 34p (Electrical Fittings)
7-6	Trolley Busway Electrification Systems; Cat. No. 76 (Feedrail)
7-7	Plug-in Busway; 11p; Cat. No. GEA-6172D (General Electric)
7-8	Isolated Phase Bus; 20p; Cat. No. 2604-1A (I-T-E)
7-9	Conduit and Fittings; 31p; Cat. No. 485 (National Supply)
7-10	Fibre Conduit; 11p; Cat. No. 52 (Orangeburg)
7-11	Underfloor Duct System; 13p; Cat. No. 203 (Orangeburg)

7-12 Electrical Metallic Tubing; 10p; Cat. No. RCP-900 (Rome)

7-13 Electrical Fittings; 30p (Sherman)

7-14 Underfloor Distribution Systems; 7p; Cat. No. 513 (Spang)

7-15 Wagner Fittings; 20p; Cat. No. 571 (Wagner)

7-16 Underfloor Duct; 20p; Cat. No. 35 (Walker)

7-17 Bus Duct; Cat. No. B-7326-380 (Westinghouse)

SECTION 8. MOTORS & GENERATORS

For flexible reference, motors are listed in four classifications: size, design, enclosure, and application.

8A. MOTORS—SIZE

1. Integral horsepower
2. Fractional horsepower
3. Sub-fractional (miniature)

Acro Switch Div Robertshaw-Fulton Controls Co 2040 E Main St Columbus 16 Ohio (3)
Alliance Mfg Co Inc Lake Park Blvd Alliance Ohio (3)
Allis (Louis) Co 427 East Stewart St Milwaukee 1 Wis (1)
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (1)
American Electronics Inc 655 West Washington Blvd Los Angeles 15 Calif (2-3)
Baldor Electric Co 4353 Duncan Ave St Louis 10 Mo (1-2)
Barber-Colman Co P O Drawer 99 Rockford Ill (2)
Bodine Electric Co 2500 W Bradley Pl Chicago 18 Ill (2-3)
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (1-2)
Bristol Motor Div Vocaline Co of America Inc Coulter St Old Saybrook Conn (3)
●BROOK MOTOR CORP 3302-4 W Peterson Ave Chicago 45 Ill (1-2)—ADV PG 130
Carter Motor Co 2711 W George St Chicago 18 Ill (2)
Century Electric Co 1806 Pine St St Louis 3 Mo (1-2)
Chandeysson Electric Co 4084 Bingham Ave St Louis 16 Mo (1)
Cleveland Electric Motor Co 5213 Chester Ave Cleveland 3 Ohio (1-2)
Continental Electric Co Inc 325 Ferry St Newark 5 NJ (1)
Cramer Controls Corp Main St Centerbrook Conn (3)
Dalmotor Co 1375 Clay St Santa Clara Calif (2-3)
Dayton Electric Mfg Co 126 S Oakley Blvd Chicago 12 Ill (1-2)
Delco Products Div General Motors Corp 329 E 1st St Dayton 1 Ohio (1-2-3)
Dumore Co 1300 17th St Racine Wis (2)
Eicor Div F L Jacobs Co 4235 W North Ave Chicago 39 Ill (2-3)
Electra Motors Inc 1110 N Lemon St Anaheim Calif (1-2)
Electric Indicator Co Inc Camp Ave Springdale Conn (2-3)
Electric Machinery Mfg Co 800 Central Ave Minneapolis 13 Minn (1)
Electric Motors & Specialties Inc King & Hamsher Sts Garrett Ind (2)
Electro Dynamic Div General Dynamics Corp 163 Ave A Bayonne NJ (1-2)
Elliott Co Jeannette Pa (1)
Emerson Electric Mfg Co 8100 Florissant Ave St Louis 21 Mo (1-2)
Fairbanks Morse & Co 600 S Michigan Ave Chicago 5 Ill (1-2)
Fasco Industries Inc Davis & Toppin Sts Rochester 2 NY (2)
Franklin Electric Co Inc 400 E Spring St Bluffton Ind (1-2)
General Electric Co Apparatus Sales Div Schenectady 5 NY (1-2-3)
Hansen Mfg Co Inc RR #1 Princeton Ind (3)
Harnischfeger Corp 4400 W National Ave Milwaukee 46 Wis (1)
Haydon (A W) Co 232 N Elm St Waterbury Conn (3)
Haydon Div General Time Corp 245 E Elm St Torrington Conn (3)
Heinze Electric Co 685 Lawrence St Lowell Mass (3)
Hertner Electric Co 12690 Elmwood Ave Cleveland 11 Ohio (1-2-3)
Holtzer-Cabot Div National Pneumatic Co Inc 125 Amory St Boston 19 Mass (2-3)
Howard Industries Inc 1760 State St Racine Wis (2-3)
Howell Electric Motors Co 409 N Roosevelt Howell Mich (1-2)
IMC Magnetics Corp 570 Main St Westbury NY (2-3)
Ideal Electric and Mfg Co East First St Mansfield Ohio (1)
Imperial Electric Co 84 Ira Ave Akron 9 Ohio (1-2)
International Register Co 2620 W Washington Blvd Chicago 12 Ill (2)
Jack & Heintz Inc 17600 Broadway Cleveland 1 Ohio (1-2)
Janette Electric Mfg Co Lehigh at Main Sts Morton Grove Ill (1-2-3)
Kingston Conley Inc North Plainfield NJ (1-2)
Kurz & Root Sales & Engineering Corp 232 East North Island St Appleton Wis (1)
Leland Electric Co 1501 Webster St Dayton 1 Ohio (1-2)
Lewus Electric Co 1254 W Harrison St Chicago 7 Ill (1-2)
Lima Electric Motor Co Inc Findlay Road Lima Ohio (1-2)
Marathon Electric Mfg Corp Wausau Wisc (1-2)
Marble Electric Corp Gladstone Mich (1)
Master Electric Div Reliance Electric & Engineering Co 126 Davis Ave Dayton 1 Ohio (2-1)
Motoresearch Co 1600 Junction Ave Racine Wis (1-2-3)
Newman Electric Motors Inc 357 Wilson Ave Newark 5 NJ (1-2)
Northwestern Electric Co 1750 N Springfield Ave Chicago 47 Ill (1-2)
Peerless Electric Div H K Porter Co Inc 1401 W Market St Warren Ohio (1-2)
Rae Motor Corp 2009 Kewaunee St Racine Wisc (2-3)
Redmond Co Inc 201 Monroe St Owosso Mich (2)
Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland 17 Ohio (1)
Reuland Electric Co 3001 W Mission Rd Alhambra Calif (1-2)
Reynolds Electric Co 3000 River Rd River Grove Ill (2)
Robbins & Myers Inc 1345 Lagonda Ave Springfield Ohio (1-2-3)
Sangamo Electric Co 11th & Converse Springfield Ill (3)
Shelby Electric Inc East US Highway #421 Shelbyville Ind (1-2)
Small Motors Inc 2076 Elston Ave Chicago 14 Ill (2-3)
Standard Electric Div Standard Dayton Corp P O Box 1001 Dayton 1 Ohio (1-2)
Sterling Electric Motors Inc 5401 Telegraph Rd Los Angeles 22 Calif (1-2)
Sutton (O A) Corp 1812 W Second Wichita Kans (2-3)
System Analyzer Corp 700 W State St Nokomis Ill (1)
Thermador Electrical Mfg Co 5119 District Blvd Los Angeles 22 Calif (2)
United Electric Machinery Co 1824E N 72 Ct Elmwood Park Ill (1-2)
U S Electrical Motors Inc 200 E Slauson Ave Los Angeles 54 Calif (1-2)
Universal Electric Co 300 E Main St Owosso Mich (2-3)
Upco 900 S Desplaines St Chicago 7 Ill (2)
●WAGNER ELECTRIC CORP 6400 Plymouth Ave St Louis 33 Mo (1-2)—ADV PG 42-141
Western Gear Corp Electro Products Div 132 W Colorado St Pasadena 1 Calif (2-3)
●WESTINGHOUSE ELECTRIC CORP P O Box 868 Pittsburgh 30 Pa (1-2)—ADV PG 4-69-70-71-72
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1-2)—ADV PG 2nd Cover

8B. MOTORS—DESIGN

1. Direct current
2. Polyphase induction
3. Polyphase synchronous
4. Single phase
5. High frequency

Allis (Louis) Co 427 East Stewart St Milwaukee 1 Wis (1 thru 4)
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (1-2-3)
American Electronics Inc 655 West Washington Blvd Los Angeles 15 Calif (1 thru 4)
Baldor Electric Co 4353 Duncan Ave St Louis 10 Mo (1-2-4)
Barber-Colman Co P O Drawer 99 Rockford Ill (1-4)
Bodine Electric Co 2500 W Bradley Pl Chicago 18 Ill (1-2-3-4)
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (1-2-4)
●BROOK MOTOR CORP 3302-4 W Peterson Ave Chicago 45 Ill (4)—ADV PG 130
Century Electric Co 1806 Pine St St Louis 3 Mo (1-2-4)
Chandeysson Electric Co 4084 Bingham Ave St Louis 16 Mo (1-2-3)
Cleveland Electric Motor Co 5213 Chester Ave Cleveland 3 Ohio (2)
Columbia Electric Mfg Co 4519 Hamilton Ave Cleveland 14 Ohio (3)
Continental Electric Co 1234 S Praire Ave (P O Box 895) Hawthorne Calif (5)
Continental Electric Co Inc 325 Ferry St Newark 5 NJ (1-2-3)
Dalmotor Co 1375 Clay St Santa Clara Calif (1-4)
Dayton Electric Mfg Co 126 S Oakley Blvd Chicago 12 Ill (2-4)
Delco Products Div General Motors Corp 329 E 1st St Dayton 1 Ohio (1 thru 4)
Dumore Co 1300 17th St Racine Wis (4)
Eicor Div F L Jacobs Co 4235 W North Ave Chicago 39 Ill (1-4)
Electra Motors Inc 1110 N Lemon St Anaheim Calif (2-3-4)
Electric Indicator Co Inc Camp Ave Springdale Conn (1 thru 4)
Electric Machinery Mfg Co 800 Central Ave Minneapolis 13 Minn (2-3)
Electric Motors & Specialties Inc King & Hamsher Sts Garrett Ind (4)
Electric Products Co 1725 Clarkstone Rd Cleveland 12 Ohio (1-2-3)
Electric Specialty Co 211 South St Stamford Conn (1)
Electro Dynamic Div General Dynamics Corp 163 Ave A Bayonne NJ (1-2)
Elliott Co Jeannette Pa (1-2-3)
Emerson Electric Mfg Co 8100 Florissant Ave St Louis 21 Mo (4)
Fairbanks Morse & Co 600 S Michigan Ave Chicago 5 Ill (1 thru 4)
Fasco Industries Inc Davis & Toppin Sts Rochester 2 NY (4)
Franklin Electric Co Inc 400 E Spring St Bluffton Ind (1-2-4)
General Electric Co Apparatus Sales Div Schenectady 5 NY (1 thru 4)
●GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (1 thru 4)—ADV PG 2
Haft & Sons Inc 950 Kent Ave Brooklyn 5 NY (4)
Hansen Mfg Co Inc RR #1 Princeton Ind (1-4)
Haydon (A W) Co 232 N Elm St Waterbury Conn (1-4)
Heinze Electric Co 685 Lawrence St Lowell Mass (1-4)
Hertner Electric Co 12690 Elmwood Ave Cleveland 11 Ohio (1-2-4)
Holtzer-Cabot Div National Pneumatic Co Inc 125 Amory St Boston 19 Mass (1 thru 4)
Howard Industries Inc 1760 State St Racine Wis (1 thru 4)
Howell Electric Motors Co 409 N Roosevelt Howell Mich (2-4)
IMC Magnetics Corp 570 Main St Westbury NY (1)
Ideal Electric and Mfg Co East First St Mansfield Ohio (1-2-3)
Jack & Heintz Inc 17600 Broadway Cleveland 1 Ohio (2-4)
Kingston Conley Inc North Plainfield NJ (2-4)
Kurz & Root Sales & Engineering Corp 232 East North Island St Appleton Wis (1 thru 4)
Leland Electric Co 1501 Webster St Dayton 1 Ohio (1-2-4)
Lewus Electric Co 1254 W Harrison St Chicago 7 Ill (4)
Lima Electric Motor Co Inc Findlay Road Lima Ohio (2-4)
Lincoln Electric Co 22801 St Clair Ave Cleveland 17 Ohio (2)
Marathon Electric Mfg Corp Wausau Wisc (1 thru 4)
Marble Electric Corp Gladstone Mich (1-2)
Master Electric Div Reliance Electric & Engineering Co 126 Davis Ave Dayton 1 Ohio (1 thru 4)
Motoresearch Co 1600 Junction Ave Racine Wis (2-4)
Newman Electric Motors Inc 357 Wilson Ave Newark 5 NJ (2-3-4)
Northwestern Electric Co 1750 N Springfield Ave Chicago 47 Ill (1-2-4)
Peerless Electric Div H K Porter Co Inc 1401 W Market St Warren Ohio (1-2-3-4)
Rae Motor Corp 2009 Kewaunee St Racine Wisc (1)
Redmond Co Inc 201 Monroe St Owosso Mich (1)
Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland 17 Ohio (1-2)
Reuland Electric Co 3001 W Mission Rd Alhambra Calif (2-3-4)
Reynolds Electric Co 3000 River Rd River Grove Ill (2-4)

Robbins & Myers Inc 1345 Lagonda Ave Springfield Ohio (1-2-3-4)
Sangamo Electric Co 11th & Converse Springfield Ill (1-4)
Shelby Electric Inc East US Highway #421 Shelbyville Ind (2-3-4)
Small Motors Inc 2076 Elston Ave Chicago 14 Ill (1-4)
Standard Electric Div Standard Dayton Corp P O Box 1001 Dayton 1 Ohio (2-4)
Sterling Electric Motors Inc 5401 Telegraph Rd Los Angeles 22 Calif (2-3-4)
Superior Electric Co 83 Laurel St Bristol Conn (4)
Sutton (O A) Corp 1812 W Second Wichita Kans (4)
System Analyzer Corp 700 W State St Nokomis Ill (2-4)
Technical Electronics Co 4060 Ince Blvd Culver City Calif (4)
United Electric Machinery Co 1824E N 72 Ct Elmwood Park Ill (4)
U S Electrical Motors Inc 200 E Slauson Ave Los Angeles 54 Calif (2)
Universal Electric Co 300 E Main St Owosso Mich (1-4)
●WAGNER ELECTRIC CORP 6400 Plymouth Ave St Louis 33 Mo (2-3-4)—ADV PG 42-141
Western Gear Corp Electro Products Div 132 W Colorado St Pasadena 1 Calif (1 thru 4)
●WESTINGHOUSE ELECTRIC CORP P O Box 868 Pittsburgh 30 Pa (1 thru 4)—ADV PG 4-69-70-71-72
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1 thru 4)—ADV PG 2nd Cover

8C. MOTORS—ENCLOSURE

1. Drip-proof
2. Explosion-proof
3. Splash-proof
4. Weatherproof
5. Hermetic
6. Submersible
7. Totally enclosed

Alliance Mfg Co Inc Lake Park Blvd Alliance Ohio (4)
Allis (Louis) Co 427 East Stewart St Milwaukee 1 Wis (1 thru 7)
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (1-2-3-4-7)
Baldor Electric Co 4353 Duncan Ave St Louis 10 Mo (1-2-3-4-7)
Bodine Electric Co 2500 W Bradley Pl Chicago 18 Ill (7)
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (1-2-3-4-6-7)
●BROOK MOTOR CORP 3302-4 W Peterson Ave Chicago 45 Ill (1-3-4-7)—ADV PG 130
Century Electric Co 1806 Pine St St Louis 3 Mo (1-2-3-4-5-7)
Chandeysson Electric Co 4084 Bingham Ave St Louis 16 Mo (1-3-4)
Continental Electric Co Inc 325 Ferry St Newark 5 NJ (1-2-3-7)
Dalmotor Co 1375 Clay St Santa Clara Calif (7)
Dayton Electric Mfg Co 126 S Oakley Blvd Chicago 12 Ill (1-2-3-7)
Delco Products Div General Motors Corp 329 E 1st St Dayton 1 Ohio (1-2-5-7)
Elcor Div F L Jacobs Co 4235 W North Ave Chicago 39 Ill (1-2-3-4-7)
Electra Motors Inc 1110 N Lemon St Anaheim Calif (1-2-3-4-7)
Electric Indicator Co Inc Camp Ave Springdale Conn (1-3-4-6-7)
Electric Machinery Mfg Co 800 Central Ave Minneapolis 13 Minn (1-3-4-7)
Electric Motors & Specialties Inc King & Hamsher Sts Garrett Ind (4-7)
Electro Dynamic Div General Dynamics Corp 163 Ave A Bayonne NJ (1-2-3-4-6-7)
Elliott Co Jeannette Pa (1-2-3-4-7)
Emerson Electric Mfg Co 8100 Florissant Ave St Louis 21 Mo (1-5)
Fairbanks Morse & Co 600 S Michigan Ave Chicago 5 Ill (1-2-3-4-6-7)
Fasco Industries Inc Davis & Toppin Sts Rochester 2 NY (1-2-3-4-6-7)
Franklin Electric Co Inc 400 E Spring St Bluffton Ind (1-2-3-4-6-7)
General Electric Co Apparatus Sales Div Schenectady 5 NY (1 thru 7)
Hansen Mfg Co Inc RR #1 Princeton Ind (7)
Haydon (A W) Co 232 N Elm St Waterbury Conn (4)
Hertner Electric Co 12690 Elmwood Ave Cleveland 11 Ohio (1)
Holtzer-Cabot Div National Pneumatic Co Inc 125 Amory St Boston 19 Mass (7)
Howard Industries Inc 1760 State St Racine Wis (7)
Howell Electric Motors Co 409 N Roosevelt Howell Mich (1-2-3-4-7)
Ideal Electric and Mfg Co East First St Mansfield Ohio (1-2-3-4-5-7)
Jack & Heintz Inc 17600 Broadway Cleveland 1 Ohio (1-2-3-6-7)
Kingston Conley Inc North Plainfield NJ (1-7)
Kurz & Root Sales & Engineering Corp 232 East North Island St Appleton Wis (1-3-7)
Leland Electric Co 1501 Webster St Dayton 1 Ohio (1-2-6-7)
Lima Electric Motor Co Inc Findlay Road Lima Ohio (1-2-4-7)
Marathon Electric Mfg Corp Wausau Wisc (1-2-3-4-5-7)
Marble Electric Corp Gladstone Mich (2-3-4-7)
Master Electric Div Reliance Electric & Engineering Co 126 Davis Ave Dayton 1 Ohio (1-2-3-4-7)
Motoresearch Co 1600 Junction Ave Racine Wis (1-7)
Newman Electric Motors Inc 357 Wilson Ave Newark 5 NJ (1-2-3-4-7)
Northwestern Electric Co 1750 N Springfield Ave Chicago 47 Ill (1-3-7)
Peerless Electric Div H K Porter Co Inc 1401 W Market St Warren Ohio (1-2-3-4-6-7)
Rae Motor Corp 2009 Kewaunee St Racine Wisc (7)
Redmond Co Inc 201 Monroe St Owosso Mich (1-3-7)
Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland 17 Ohio (1 thru 7)
Reuland Electric Co 3001 W Mission Rd Alhambra Calif (1-3-4-7)
Reynolds Electric Co 3000 River Rd River Grove Ill (1-3)
Robbins & Myers Inc 1345 Lagonda Ave Springfield Ohio (1-2-3-4-7)
Shelby Electric Inc East US Highway #421 Shelbyville Ind (1-3-7)
Small Motors Inc 2076 Elston Ave Chicago 14 Ill (1-3-4-7)
Standard Electric Div Standard Dayton Corp P O Box 1001 Dayton 1 Ohio (1-3-4-7)
Sterling Electric Motors Inc 5401 Telegraph Rd Los Angeles 22 Calif (1-2-3-4-7)
Superior Electric Co 83 Laurel St Bristol Conn (2)
System Analyzer Corp 700 W State St Nokomis Ill (1-4-7)
United Electric Machinery Co 1824E N 72 Ct Elmwood Park Ill (1-2-3-4-7)
U S Electrical Motors Inc 200 E Slauson Ave Los Angeles 54 Calif (1-2-3-4-7)
Universal Electric Co 300 E Main St Owosso Mich (1-3-7)
●WAGNER ELECTRIC CORP 6400 Plymouth Ave St Louis 33 Mo (1 thru 7)—ADV PG 42-141
Western Gear Corp Electro Products Div 132 W Colorado St Pasadena 1 Calif (1 thru 7)
●WESTINGHOUSE ELECTRIC CORP P O Box 868 Pittsburgh 30 Pa (1 thru 7)—ADV PG 4-69-70-71-72

8D. MOTORS—APPLICATION

1. Brake
2. Gear
3. Aircraft
4. Automotive
5. Railway
6. Mining
7. Marine
8. Timing
9. Oil burner
10. Elevator
11. Pump
12. Crane & hoist
13. Power tool
14. Sewing machine
15. Instrument
16. Fan
17. Agitator drive
18. Stepping

Adams Engineering Co 31711 Solon Rd Solon Ohio (2)
Alliance Mfg Co Inc Lake Park Blvd Alliance Ohio (8-11-16)
Allis (Louis) Co 427 East Stewart St Milwaukee 1 Wis (1-2 thru 13-16)
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (2-7)
American Electronics Inc 655 West Washington Blvd Los Angeles 15 Calif (1-2-3-15-16)
Atlas Tool and Mfg Co 5147 Natural Bridge Ave St Louis 15 Mo (2)
Baldor Electric Co 4353 Duncan Ave St Louis 10 Mo (7)
Barber-Colman Co P O Drawer 99 Rockford Ill (2-3-15-16)
Bernina Sewing Machine Co 29 W 35 St NY 1 NY (14)
Bodine Electric Co 2500 W Bradley Pl Chicago 18 Ill (8-11-13-14-15)
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (3-5-7-11)
Bristol Motor Div Vocaline Co of America Inc Coulter St Old Saybrook Conn (8)
●BROOK MOTOR CORP 3302-4 W Peterson Ave Chicago 45 Ill (10-11-12)—ADV PG 130
Century Electric Co 1806 Pine St St Louis 3 Mo (1-2-7-9-10 thru 14-16)
Cleveland Electric Motor Co 5213 Chester Ave Cleveland 3 Ohio (1-10-11-12-16)
Continental Electric Co Inc 325 Ferry St Newark 5 NJ (10-11-12)
Cramer Controls Corp Main St Centerbrook Conn (8)
Dalmotor Co 1375 Clay St Santa Clara Calif (1-2-3-8-16)
Delco Products Div General Motors Corp 329 E 1st St Dayton 1 Ohio (1 thru 7-9-10-16)
Dumore Co 1300 17th St Racine Wis (2)
Elcor Div F L Jacobs Co 4235 W North Ave Chicago 39 Ill (1-3-5-6-7-11-15-16)
Electra Motors Inc 1110 N Lemon St Anaheim Calif (1-2-10-11-12-13-16)
Electric Indicator Co Inc Camp Ave Springdale Conn (1-2-3-5-6-7-8-11-13-15-16)
Electric Machinery Mfg Co 800 Central Ave Minneapolis 13 Minn (6-11-12-16)
Electric Motors & Specialties Inc King & Hamsher Sts Garrett Ind (16)
Electric Specialty Co 211 South St Stamford Conn (1-3)
Electrical Mfg Co 425 Lake Ave Racine Wis (14)
Electro Dynamic Div General Dynamics Corp 163 Ave A Bayonne NJ (1-2-3-4-5-6-7-8-9-10-11-12-13-14-15)
Elliott Co Jeannette Pa (1-2-9-11-12-16)
Fairbanks Morse & Co 600 S Michigan Ave Chicago 5 Ill (1-2-5-6-7-9 thru 12-16)
Falk Corp Box 492 Milwaukee 1 Wis (2)
Fasco Industries Inc Davis & Toppin Sts Rochester 2 NY (9-11-16)
Franklin Electric Co Inc 400 E Spring St Bluffton Ind (2-11-12-13-16)
General Electric Co Apparatus Sales Div Schenectady 5 NY (1-2-4-5-6-7-9 thru 16)
Hansen Mfg Co Inc RR #1 Princeton Ind (8-15)
Harnischfeger Corp 4400 W National Ave Milwaukee 46 Wis (12)
Haydon (A W) Co 232 N Elm St Waterbury Conn (8-15)
Heinze Electric Co 685 Lawrence St Lowell Mass (2-4-14-16)
Holtzer-Cabot Div National Pneumatic Co Inc 125 Amory St Boston 19 Mass (2-8-15)
Howard Industries Inc 1760 State St Racine Wis (2-3-4-5-8-13-14-15-16)
Howell Electric Motors Co 409 N Roosevelt Howell Mich (1-2-10-11-12)
Ideal Electric and Mfg Co East First St Mansfield Ohio (6-7-11-12-16)
International Register Co 2620 W Washington Blvd Chicago 12 Ill (8)
Jack & Heintz Inc 17600 Broadway Cleveland 1 Ohio (11-12-13-14)
Janette Electric Mfg Co Lehigh at Main Sts Morton Grove Ill (2)
Kingston Conley Inc North Plainfield NJ (11-12-13-16)
Kurz & Root Sales & Engineering Corp 232 East North Island St Appleton Wis (10)
Leland (G H) Inc 123 Webster St Dayton 2 Ohio (18)
Leland Electric Co 1501 Webster St Dayton 1 Ohio (1-11-12-13)
Lima Electric Motor Co Inc Findlay Road Lima Ohio (1-2-11-13-16)
Marathon Electric Mfg Corp Wausau Wisc (6-7-9-11-13-16)
Marble Electric Corp Gladstone Mich (1-2-6-7-11-12-16)
Master Electric Div Reliance Electric & Engineering Co 126 Davis Ave Dayton 1 Ohio (1-2-7-10-11-12-13-16)
Minneapolis-Honeywell Regulator Co Industrial Div Wayne & Windrim Aves Phila 44 Pa (15)
Morse Chain Co Borg Warner Corp Ithaca NY (2)
Motoresearch Co 1600 Junction Ave Racine Wis (2-3)
Northwestern Electric Co 1750 N Springfield Ave Chicago 47 Ill (2-3-5-6-7-10-11-12-16)
Peerless Electric Div H K Porter Co Inc 1401 W Market St Warren Ohio (1-6-7-10-11-12-13-16)
Rae Motor Corp 2009 Kewaunee St Racine Wisc (1-2-14)
Redmond Co Inc 201 Monroe St Owosso Mich (7-9-11-13-14-16)
Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland 17 Ohio (1-2-6-7-10-11-12-13)
Reuland Electric Co 3001 W Mission Rd Alhambra Calif (1-2-9-10-11-12-16)
Reynolds Electric Co 3000 River Rd River Grove Ill (16)
Robbins & Myers Inc 1345 Lagonda Ave Springfield Ohio (9 thru 13-16)
Sangamo Electric Co 11th & Converse Springfield Ill (8)
Shelby Electric Inc East US Highway #421 Shelbyville Ind (1-2-11-12-13-16-17)
Small Motors Inc 2076 Elston Ave Chicago 14 Ill (9-11-14-16)
Standard Electric Div Standard Dayton Corp P O Box 1001 Dayton 1 Ohio (1-2-10-11-12-13)
Sterling Electric Motors Inc 5401 Telegraph Rd Los Angeles 22 Calif (1-2)
Sutton (O A) Corp 1812 W Second Wichita Kans (16)
United Electric Machinery Co 1824E N 72 Ct Elmwood Park Ill (1-2)
U S Electrical Motors Inc 200 E Slauson Ave Los Angeles 54 Calif (2-3-10-11-16)
Universal Electric Co 300 E Main St Owosso Mich (9-11-16)
Western Gear Corp Electro Products Div 132 W Colorado St Pasadena 1 Calif (1-2-3-8-11-15-16)
●WESTINGHOUSE ELECTRIC CORP P O Box 868 Pittsburgh 30 Pa (1 thru 7-9 thru 13-16-17)—ADV PG 4-69-70-71-72

8E. GENERATORS

1. Alternating current
2. Direct current
3. High frequency

For changing mechanical energy to electrical energy; often called "dynamos" or "alternators."

Allis (Louis) Co 427 East Stewart St Milwaukee 1 Wis (1-2)
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (1-2)
American Electronics Inc 655 West Washington Blvd Los Angeles 15 Calif (1)
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (1-2)
Century Electric Co 1806 Pine St St Louis 3 Mo (1-2)
Chandeysson Electric Co 4084 Bingham Ave St Louis 16 Mo (1-2)
Columbia Electric Mfg Co 4519 Hamilton Ave Cleveland 14 Ohio (1-2)
Continental Electric Co Inc 325 Ferry St Newark 5 NJ (1-2)
D & R Ltd 402 E Gutierrez St P O Box 1500 Santa Barbara Calif (1)
Dalmotor Co 1375 Clay St Santa Clara Calif (1-2)
Delco Products Div General Motors Corp 329 E 1st St Dayton 1 Ohio (1-2)
Elcor Div F L Jacobs Co 4235 W North Ave Chicago 39 Ill (1-2)
Electric Indicator Co Inc Camp Ave Springdale Conn (1-2)
Electric Machinery Mfg Co 800 Central Ave Minneapolis 13 Minn (1)
Electric Products Co 1725 Clarkstone Rd Cleveland 12 Ohio (1-2)
Electric Specialty Co 211 South St Stamford Conn (1-2-3)
Electro Dynamic Div General Dynamics Corp 163 Ave A Bayonne NJ (2)
Elliott Co Jeannette Pa (1-2)
Fairbanks Morse & Co 600 S Michigan Ave Chicago 5 Ill (1-2)
Fidelity Electric Co Inc 332 N Arch St Lancaster Pa (1)
General Electric Co Apparatus Sales Div Schenectady 5 NY (1-2)
Georator Corp Manassas Va (1-2)
Hertner Electric Co 12690 Elmwood Ave Cleveland 11 Ohio (1-2)
Holtzer-Cabot Div National Pneumatic Co Inc 125 Amory St Boston 19 Mass (1-2)
Homelite Div Textron Inc 67 Riverdale Ave Port Chester NY (1-2)
Ideal Electric and Mfg Co East First St Mansfield Ohio (1-2)
Kato Engineering Co 1442 First Ave Mankato Minn (1)
Katolight Corp First Ave at Chestnut (P O Box 891) Mankato Minn (3)
Kurz & Root Sales & Engineering Corp 232 East North Island St Appleton Wis (1-2)
Leece-Neville Co 1374 E 51 St Cleveland 3 Ohio (1)
Leland Electric Co 1501 Webster St Dayton 1 Ohio (1-2)
Marathon Electric Mfg Corp Wausau Wisc (1-2)
Marble Electric Corp Gladstone Mich (1-2)
Master Electric Div Reliance Electric & Engineering Co 126 Davis Ave Dayton 1 Ohio (1-2)
Motoresearch Co 1600 Junction Ave Racine Wis (1-2)
Northwestern Electric Co 1750 N Springfield Ave Chicago 47 Ill (1-2)
Onan (D W) & Sons Inc 2515 University Ave S E Minneapolis 14 Minn (1-2)
Peerless Electric Div H K Porter Co Inc 1401 W Market St Warren Ohio (2)
Rae Motor Corp 2009 Kewaunee St Racine Wisc (2)
Robbins & Myers Inc 1345 Lagonda Ave Springfield Ohio (1)
Sangamo Electric Co 11th & Converse Springfield Ill (2)
Small Motors Inc 2076 Elston Ave Chicago 14 Ill (1-2)
Welduction Corp 19400 W Eight Mile Rd (P O Box 146) Southfield Mich (3)
Western Gear Corp Electro Products Div 132 W Colorado St Pasadena 1 Calif (1-2)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1-2)
Wincharger Corp E Seventh & Division St Sioux City 2 Iowa (1-2)
Winpower Mfg Co Newton Iowa (1-2)

8F. POWER GENERATING SETS

1. Steam engine powered
2. Steam turbine powered
3. Diesel engine powered
4. Gasoline engine powered
5. Gas turbine powered
6. Mercury turbine powered
7. Balancer sets
8. Motor-driven (M-G sets)

Engine-driven generating plants for providing electricity for power or lighting.

Allis (Louis) Co 427 East Stewart St Milwaukee 1 Wis (8)
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (2-3-4-7-8)
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (3-8)
Caterpillar Tractor Co Industrial Engine Plant Peoria Ill (3-5)
Chandeysson Electric Co 4084 Bingham Ave St Louis 16 Mo (3-4-8)
Chicago Pneumatic Tool Co 6 E 44 St NY 17 NY (3)
Columbia Electric Mfg Co 4519 Hamilton Ave Cleveland 14 Ohio (8)
Coppus Engineering Corp 344 Park Ave Worcester 10 Mass (2)
D & R Ltd 402 E Gutierrez St P O Box 1500 Santa Barbara Calif (2-8)
Dayton Electric Mfg Co 126 S Oakley Blvd Chicago 12 Ill (4)
Detroit Diesel Engine Div General Motors Corp 13400 W Outer Dr Detroit 28 Mich (3)
Elcor Div F L Jacobs Co 4235 W North Ave Chicago 39 Ill (8)
Electric Indicator Co Inc Camp Ave Springdale Conn (8)
Electric Power Plants Corp Buffalo St Cadiz Ohio (3-4)
Electric Products Co 1725 Clarkstone Rd Cleveland 12 Ohio (8)
Electric Specialty Co 211 South St Stamford Conn (8)
Elliott Co Jeannette Pa (1-2-3-5-8)
Empire Corp 1566 S 83rd St Milwaukee 14 Wis (3-4)
Fairbanks Morse & Co 600 S Michigan Ave Chicago 5 Ill (3-4-7-8)
GM Diesel 13400 W Outer Dr Detroit 28 Mich (3)
General Electric Co Apparatus Sales Div Schenectady 5 NY (2-3-5 thru 8)
Graybar Electric Co Inc 420 Lexington Ave NY 17 NY (8)
Harnischfeger Corp 4400 W National Ave Milwaukee 46 Wis (3)
Hertner Electric Co 12690 Elmwood Ave Cleveland 11 Ohio (7-8)
Homelite Div Textron Inc 67 Riverdale Ave Port Chester NY (4)
Howard Industries Inc 1760 State St Racine Wis (4)
International Fermont Machinery Co Inc Ramapo NY (3-4-5)
Jeta Inc Yonkers NY (3-4)
Kato Engineering Co 1442 First Ave Mankato Minn (8)
Katolight Corp First Ave at Chestnut (P O Box 891) Mankato Minn (3-4-8)
Kohler Co Kohler Wis (3)
Kurz & Root Sales & Engineering Corp 232 East North Island St Appleton Wis (8)
●LEACH CORP 5915 Avalon Blvd Los Angeles 3 Calif (4-8)—ADV PG 124
Marble Electric Corp Gladstone Mich (8)
Master Electric Div Reliance Electric & Engineering Co 126 Davis Ave Dayton 1 Ohio (8)
Milwaukee Electric Tool Corp 5368 W State St Milwaukee 8 Wisc (4)
Moon Mfg Co 108 N Jefferson St Chicago 6 Ill (2)
Motoresearch Co 1600 Junction Ave Racine Wis (4)
Nordberg Mfg Co 3073 S Chase Ave Milwaukee 1 Wis (3)
Northwestern Electric Co 1750 N Springfield Ave Chicago 47 Ill (8)
Onan (D W) & Sons Inc 2515 University Ave S E Minneapolis 14 Minn (3-4)
Petter Diesel Engine Div Brush Aboe Inc 34-14 58th St Woodside 77 NY (3)
Pioneer Gen-E-Motor Co 5841 W Dickens Ave Chicago 39 Ill (4)
Potter & Rayfield Inc P O Box 1042 Atlanta Ga (7)
Pyle-National Co 1344 N Kostner Ave Chicago 51 Ill (2)
Ready-Power Co 11231 Freud Ave Detroit 14 Mich (3-4)
Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland 17 Ohio (8)
Thor Power Tool Co 175 N State St Aurora Ill (4)
Tocco Div Ohio Crankshaft Co 3800 Harvard Ave Cleveland 5 Ohio (8)
United States Motors Corp 102 W 5th Ave Oshkosh Wisc (3-4)
Universal Motor Co 438 Universal Dr Oshkosh Wis (3-4)
Waukesha Motor Co Waukesha Wis (3-4)
Welduction Corp 19400 W Eight Mile Rd (P O Box 146) Southfield Mich (8)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1-2-5-8)
Wincharger Corp E Seventh & Division St Sioux City 2 Iowa (4)
Winpower Mfg Co Newton Iowa (3-4)
Young Engine Corp P O Box 532 Canton Ohio (4)

8G. DYNAMOTORS

Rotating machine for changing dc power from one voltage to another.

Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ
Carter Motor Co 2711 W George St Chicago 18 Ill
Continental Electric Co Inc 325 Ferry St Newark 5 NJ
Dalmotor Co 1375 Clay St Santa Clara Calif
Elcor Div F L Jacobs Co 4235 W North Ave Chicago 39 Ill
Electric Specialty Co 211 South St Stamford Conn
General Electric Co Apparatus Sales Div Schenectady 5 NY
Holtzer-Cabot Div National Pneumatic Co Inc 125 Amory St Boston 19 Mass
Howard Industries Inc 1760 State St Racine Wis
IMC Magnetics Corp 570 Main St Westbury NY
Sangamo Electric Co 11th & Converse Springfield Ill
Small Motors Inc 2076 Elston Ave Chicago 14 Ill
Wagner Electric Corp 6400 Plymouth Ave St Louis 33 Mo
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa

8H. EXCITERS

For providing and maintaining magnetic field of motors or generators.

Allis (Louis) Co 427 East Stewart St Milwaukee 1 Wis
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis
American Electronics Inc 655 West Washington Blvd Los Angeles 15 Calif
Century Electric Co 1806 Pine St St Louis 3 Mo
Continental Electric Co Inc 325 Ferry St Newark 5 NJ
Elcor Div F L Jacobs Co 4235 W North Ave Chicago 39 Ill
Electric Specialty Co 211 South St Stamford Conn
Elliott Co Jeannette Pa
Fairbanks Morse & Co 600 S Michigan Ave Chicago 5 Ill
General Electric Co Apparatus Sales Div Schenectady 5 NY
Hertner Electric Co 12690 Elmwood Ave Cleveland 11 Ohio
Ideal Electric and Mfg Co East First St Mansfield Ohio
Kato Engineering Co 1442 First Ave Mankato Minn
Kurz & Root Sales & Engineering Corp 232 East North Island St Appleton Wis
Marathon Electric Mfg Corp Wausau Wisc
Master Electric Div Reliance Electric & Engineering Co 126 Davis Ave Dayton 1 Ohio
Northwestern Electric Co 1750 N Springfield Avenue Chicago 47 Ill (8H)
Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland 17 Ohio
Richardson-Allen Corp 116-15 Fifteenth Ave College Point LI NY
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa

8J. VARIABLE SPEED DRIVES

Allis (Louis) Co 427 East Stewart St Milwaukee 1 Wis
Electric Products Co 1725 Clarkstone Rd Cleveland 12 Ohio
Lewis-Shepard Products Inc 125 Walnut St Watertown Mass (8J)
Morse Chain Co Borg Warner Corp Ithica NY
Reeves Pulley Co 1225 7th St Columbus Ind
Servospeed Div Electro Devices Inc 4 Godwin Ave Paterson NJ
Sterling Electric Motors Inc 5401 Telegraph Rd Los Angeles 22 Calif
U S Electrical Motors Inc 200 E Slauson Ave Los Angeles 54 Calif

TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers* on the Free Information cards elsewhere in this issue.

*Code No.	Description, Pages Catalog No. & Mfr.
8-1	Gearmotors; Cat. No. 51B9172 (Allis-Chalmers)
8-2	Motors; 11p; Cat. No. S-2 (Bodine)
8-3	Light & Power Plants; 100p (Katolight)
8-4	Electric Plants; 12p; Cat. No. E344 (Kohler)
8-5	Electric Plants; 8p; Cat. No. F-146 (Onan)
8-6	Electric Plants & Controls; 7p; Cat. No. 32C (Onan)
8-7	Power Units; Cat. No. 118A (Opad)
8-8	Electric Motors; 7p (Porter)
8-9	Electric Motors; 10p; Cat. No. 25M-6773 (Redmond)
8-10	Drip-Proof Motors; Cat. No. 196 (Sterling)
8-11	Power Drives; 68p; Cat. No. 258 (Sterling)

SECTION 9. LIGHTING EQUIPMENT AND LAMPS

See Section 5 for fixture hangers and supports, ballasts, and other lamp accessories; dimmers are listed in 3J.

9A. RESIDENTIAL LIGHTING FIXTURES

1. Ceiling downlights
2. Ceiling suspended units
3. Fluorescent
4. Vaporproof
5. Overall ceilings
6. Wall brackets
7. Bath mirror lights
9. Stair tread lights
10. Portable lamps (floor, table, desk, bed)
11. Entrance, porch, driveway, patio lights
12. Garden lights
13. Illuminated house numbers
14. Night lights

AOW Corp 450 N Ninth St Elwood Ind (10)
Abrams Lighting 785 Schuylkill Ave Philadelphia 46 Pa (3-7)
Ace Lighting Products Co 230 Eugenia St S W Atlanta 3 Ga (1-2-3-6-7-11)
Acme Lighting & Mfg Co 949 E 31 St Los Angeles 11 Calif (3)
Acme Lite Products Co Inc Congers NY (10)
Active Specialty Corp Elm St Walden NY (1-2-6-7-10-11)
Adalet Mfg Co 14300 Lorain Ave Cleveland 11 Ohio (4)
Adjusta Post Mfg Co 908 St Clair St Akron 7 Ohio (11)
Aerolux Lights Corp 653 11th Ave New York 36 NY (10)
Afco Lite Corp 1378 N Wolcott Chicago 22 Ill (11-12)
Alkco Mfg Co 4242 N Lincoln Ave Chicago 18 Ill (1-3)
All-Brite Light Co 400 S 12 St Reading Pa (3)
Amplex Corp 111 Water St Brooklyn 1 NY (1-6-10)
Amplex Corp Glen Cove Rd Carle Place Long Island NY (1-6-10)
Apollo Lighting Fixture Co Inc 162 W Third St Mt Vernon NY (3)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 Ill (12)
Arrow Lamps Inc 1270 Broadway New York 1 NY (10)
Art Metal Co 1814 E 40 St Cleveland 3 Ohio (1-6-7-9-11)
Art Specialty Co 3720 N Milwaukee Ave Chicago 41 Ill (10)
Artcraft Lighting Co Inc 248 McKibben St Brooklyn 6 NY (2-6)
Artistic Lamp Mfg Co Inc 401 Fourth Ave NY 16 NY (2-10)
Artolier Corp 139 Main St Lodi NJ (1-2-6-11-12)
Atlas Electric Products Co 319 Ten Eyck St Brooklyn 6 NY (1-9-11)
B M D & R Inc 7020 Walker St St Louis Park Minneapolis 16 Minn (11)
Beckley Electric Co Inc 468-470 Grand Ave Brooklyn 38 NY (11-12)
Benjamin Div Thomas Industries Inc 207 E Broadway Louisville 2 Ky (11-12)
Black (M) Mfg Co 300-08 N Third St Phila 6 Pa (11-12)
Blackhawk Industries 250 S Main St Dubuque Iowa (11)
Calpa Products Co 5420 Paschall Ave Phila 43 Pa (10)
Calumet Plastics Inc 11201 S Cottage Grove Avenue Chicago 28 Illinois (13)
Cannon Electric Co 3208 Humboldt St Los Angeles 31 Calif (12)
Ceiling Materials Co 1035 Firestone Blvd Memphis Tenn (5)
Columbia Electric & Mfg Co North 2310 Fancher Way Spokane Wash (5)
Comet Lamp Co 5 E 35 St New York 16 NY (2)
Compco Corp 1800 N Spaulding Ave Chicago 47 Ill (1-2-3-6-9-11)
Condi-Lite Corp 889 Broadway New York 3 NY (1)
Curtis Development & Mfg Co 3244 N 33 St Milwaukee 16 Wis (13)
Day-Brite Lighting Inc 6260 N Broadway St Louis 15 Mo (1)
Duralite Lanterns Inc 163 Long Beach Rd Island Park NY (11)
Duray Fluorescent Mfg Co 3318 W Montrose Ave Chicago 18 Ill (3)
E J S Lighting Corp 321 E Pico Blvd Los Angeles 21 Calif (1-2-6-10)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (6-7-9-10-11)
Eagle Mfg Co 3508 Avalon Blvd Los Angeles 11 Calif (1-6-10)
Edmor Lamp Co Inc 1867 Flatbush Ave Brooklyn 10 NY (6-10)
Elite Glass Co Inc 111 W 22nd St New York 11 NY (1-2-6)
Emerson-Imperial Lighting Co Loyalhanna Park Latrobe Pa (1-2-6-7-11)
Emerson-Pryne Co Towne Ave at Monterey (P O Box 698) Pomona Calif (1-11)
Esty Mfg Co 112 S Sangamon St Chicago 7 Ill (1-2-3-6-7-11)
Everglow Lighting Fixture Co Inc 332 E Jericho Turnpike Huntington Station NY (3-11)
Federal Lighting Corp 1425 Rockwell Ave Cleveland 14 Ohio (1-2-3-6-11-13)
Flexo International Corp 3720 N Milwaukee Ave Chicago 41 Ill (10)
Fluorescent Equipment & Mfg Co 5105 Cowan Ave Cleveland 27 Ohio (3-7)
Fluorescent Fixtures of California 352 Shaw Rd South San Francisco Calif (3)
Fostoria Pressed Steel Corp N Main St Fostoria Ohio (12)
Frisbie (H C) Co 1120 E Pico Blvd Los Angeles 21 Calif (1-2-4-5-6-11)
Gem Electric Mfg Co Inc 237 37th Street Brooklyn NY (11-14)
General Lighting Co 248 McKibbin St Brooklyn 6 NY (1-2-3-6-10-11)
Geringer & Sons Mfg Corp Peekskill NY (1-2-3-6)
Gleason Sales Co Inc 5809 W Montrose Ave Chicago 34 Ill (1)
Globe Lighting Products Inc 1710 Flushing Ave Brooklyn 37 NY (1-2-3-6-10-11-12)
Graybar Electric Co Inc 420 Lexington Ave NY 17 NY (2)
Great Northern Mfg Corp 1056 N Wood St Chicago 22 Ill (3)
Guth (Edwin F) Co 2615 Washington Blvd St Louis 3 Mo (1-3-5-6-11)
Hadco Aluminum Products Co P Box 128 Littlestown Pa (11)
Hasco Electric Corp 30 Grove Ave New Rochelle NY (3-12)
Holophane Co Inc 342 Madison Ave New York 17 NY (11)
House-O-Lite Corp 2430 S Ashland Ave Chicago 8 Ill (1-3-6-7-13)
Independent Protection Co Inc 1605-07 S Main St Goshen Ind (11-12)
Industrial Lamp Corp 14th & Blaine Sts Elkhart Ind (10)
International Lighting Mfg Co 1825 N 19 St St Louis 6 Mo (1-2-3-6-7-11-12)
Jackson Electrical Co 900 W Van Buren St Chicago 7 Ill (4-11-12)
Jay Lighting Mfg Co Inc 23-29 Quincy St Brooklyn 38 NY (1-2-6-7)
K-B Lighting Mfg Co 2101 Byberry Rd Phila 16 Pa (3)
Kalsan Electric Co Inc 146 Mott St Oceanside LI NY (1-2-6-11)
Kelly Specialty Co 5958-60 Washington Blvd Chicago 44 Ill (13)
Kent Lighting Corp 500 Johnson Ave Brooklyn 37 NY (1-3-6)
Keystone Electric Mfg Co 2228 E Tioga St Phila 34 Pa (3-6)
Kichler (L D) Co 2101 Superior Ave Cleveland 14 Ohio (1-2-6-7)
Killark Electric Mfg Co 3940 Easton Ave St Louis 13 Mo (4-12)
Kirlin Co 3435 E Jefferson Ave Detroit 7 Mich (1-9-11)
Kliegl Bros Universal Electric Stage Lighting Co Inc 321 W 50 St NY 19 NY (1)
Kliglite Mfg Co 316 Delancey St Phila 6 Pa (3)
Koch & Lowy Inc 201 E 34 St New York 16 NY (6-10)
LAM Inc 414 Main St Wakefield Mass (3-6-7)
Leader Lamp Mfg Co 476 Broome St NY 13 NY (1-2-6-7-11)
Lightolier Inc 346 Claremont Ave Jersey City 5 NJ (1-2-3-6-7-10-11-12)
Litecraft Mfg Corp 100 Dayton Ave Passaic NJ (1-2-3-5-6-9-11)
Lithonia Lighting Products Co Box 206 Conyers Ga (3)
Luminous Ceilings Inc 3701 N Ravenswood Ave Chicago 13 Ill (5)
Magni Flood Inc 50 Crary Ave Mt Vernon NY (11-12)
Majestic Metal Spinning & Stamping Co Inc 537 Sackett St Brooklyn 17 NY (1-2-6)
Markel Electric Products Inc 145 Seneca St Buffalo 3 NY (1-2-6-11-12)
Marks Mfg Co 700 N Carpenter St Chicago 22 Ill (1-6-10)
Markstone Mfg Co 1531 N Kingsbury Chicago 22 Ill (1-2-3-6-7-11)
Marvin Electric Mfg Co 648 Santa Fe Ave Los Angeles 21 Calif (1-3-6-11)
McPhilben Mfg Co Inc 1329 Willoughby Ave Brooklyn 37 NY (4-7-9-11)
Mid-West Chandelier Co 15th & Gentry (P O Box 7365) North Kansas City 16 Mo (3)
Miller Co Illuminating Div 99 Center St Meriden Conn (2)
MiroFlector Co Inc 40 Bayview Ave Inwood LI NY (1-2-6-7-10-11)
Mitchell Lighting Div Compco Corp 1800 N Spaulding Ave Chicago 47 Ill (1-3)
Modern Swimming Pool Co Inc 1 Holland Ave White Plains NY (4)
Moe Light Div Thomas Industries Inc 410 S 3rd St Louisville Ky (1-2-3-5-6-7-12)
N L Corp 2480 E 22 St Cleveland 15 Ohio (1-11-13)
Nemco Electric Co 210 Second Ave Seattle 4 Wash (1-2-4-6-7-11-12)
Neo-Ray Products Inc 315 E 22 St NY 10 NY (3)
Novelty Lighting Corp 2480 E 22 St Cleveland 15 Ohio (1-11-13)
Osoco Mfg Co P O Box 7268 Ft Worth Tex (11)
Pass & Seymour Inc Syracuse 9 NY (1-6-7-11)
Perfeclite Co 1457 E 40 St Cleveland 3 Ohio (9)
Perfect-Line Mfg Corp Old Country Rd & Railroad Ave P O Box 65 Hicksville LI NY (10-11-12)
Pittsburgh Reflector Co Oliver Bldg Mellon Square Pittsburgh 22 Pa (3-5)
Prescolite Mfg Corp 2229 Fourth St Berkeley 10 Calif (1-2-6-7-9-10-11)
●PROGRESS MFG CO INC Castor Ave & Tulip St Phila 34 Pa (1-2-3-6-7-11-12)—ADV PG 138
Project Fixture Mfg Corp 55 Ongley St Rockville Centre NY (1-2-5-6-7-10-11-12)
Quaker City Electric Mfg Co 2810 E Pacific St Phila 34 Pa (3)
Rab Electric Mfg Co Inc 605 E 132 St New York 54 NY (4-11-12)
Revere Electric Mfg Co 7420 N Lehigh Ave Chicago 48 Ill (12)
Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa (10)
Russell & Stoll Co Inc 125 Barclay St (12)
Segil (L J) Co 2500 W North Ave Chicago 47 Ill (1-2-3-11)
Shalda Mfg Co Inc 156 W Providencia Ave Burbank Calif (12)
Southeast Lighting Inc 521 E 20 St Charlotte 1 NC (3)
Spero Electric Corp 20500 St Clair Ave Cleveland 17 Ohio (4-11-12)
Stabrite Fluorescent Mfg Co 3550 Northwest 49 St Miami Fla (1-3-10-11)
Steber Mfg Co 2700 Roosevelt Rd Broadview Ill (11-12)
Sternberg Mfg Co 4510 Addison St Chicago 41 Ill (11)
Stocker & Yale Inc Green St Marblehead Mass (10)
Stonco Electric Products Co 333 Monroe Ave Kenilworth NJ (4-11-12)
Swiveller Co Inc Nanuet NY (1-2-3-6-7-10-12)
Sylvania Electric Products Inc 1740 Broadway New York 19 NY (1-2)
Tolen (William) & Son Inc 4041 Ridge Ave Philadelphia Pa (10)
Tower Craftsmen Inc 105 Chestnut St Red Bank NJ (10)
Union Insulating Co Inc Box 351 Parkersburg W Va (10-11-12)
United Lighting & Ceiling Co 2828 Ford St Oakland 1 Calif (5)
Versen (Kurt) Co 4 Slocum Ave Englewood NJ (1-2-6-10)
Virden (John C) Co 5009-6103 Longfellow Ave Cleveland 3 Ohio (1-2-3-6-7-11-12)
Weiss and Biheller Merchandise Corp 584 Broadway NY 12 NY (1-2-6)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (3-14)
White (O C) Sales Co 40 Green St Marblehead Mass (10)
Wilson (J A) Lighting & Display Inc 1502 Industrial Dr Erie Pa (1)

9C. COMMERCIAL, INSTITUTIONAL & INDUSTRIAL LIGHTING EQUIPMENT

1. Incandescent fixtures
2. Fluorescent fixtures
3. Mercury & sodium vapor fixtures
4. Cold cathode fixtures
5. Arc lighting equipment
6. Neon lighting
7. Explosion-proof fixtures
8. Vaporproof fixtures
9. Dust-tight fixtures
10. Complete luminous ceiling systems
11. Warning lights
12. Pilot & indicating light assemblies
13. Showcase & display lighting
14. Emergency lighting unit & systems
15. Stage lighting
16. Church lighting
17. Hospital lighting
18. Exit lights
19. Public building lighting
20. Battery-operated fluorescent fixtures
21. Lighted display signs

See also "Outdoor Lighting".

Abolite Lighting Div Jones Metal Products Co West Lafayette Ohio (1)
Abrams Lighting 785 Schuylkill Ave Philadelphia 46 Pa (2-13)
Acme Lighting & Mfg Co 949 E 31 St Los Angeles 11 Calif (2-13)

Adalet Mfg Co 14300 Lorain Ave Cleveland 11 Ohio (8)
Adjustable Fixture Co 104 E Mason St Milwaukee 2 Wis (1-17)
Ainsworth Lighting Inc 38-10 Twenty-Ninth St L I C 1 NY (1-2)
Aikco Mfg Co 4242 N Lincoln Ave Chicago 18 Ill (1-2)
All-Brite Light Co 400 S 12 St Reading Pa (2-13)
Amplex Corp Glen Cove Rd Carle Place Long Island NY (1-13)
Apollo Lighting Fixture Co Inc 162 W Third St Mt Vernon NY (1-2)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 Ill (1-2-3-7-8-9)
Art Metal Co 1814 E 40 St Cleveland 3 Ohio (1-13)
Artcraft Lighting Co Inc 248 McKibben St Brooklyn 6 NY (1-2-13)
Atlas Electric Products Co 319 Ten Eyck St Brooklyn 6 NY (1-2-11)
B M D & R Inc 7020 Walker St St Louis Park Minneapolis 16 Minn (1-2-11)
Baker-Barkon Co 1335 S W Morrison St Portland Ore (1)
Benjamin Div Thomas Industries Inc 207 E Broadway Louisville 2 Ky (1-2-3-7-8-9-11-13)
Cable Electric Products Inc 234 Daboll St Providence 7 RI (14)

●**CANNING-PEKARA INC 2144 N Wood St Chicago 14 Ill (2-13-16)—ADV PG 114**

Capitol Hardware Mfg Co Inc 400 N Leavitt St Chicago Ill (13)
Capitol Stage Lighting Co Inc 527 W 45 St New York 36 NY (1-15)
Carpenter Mfg Co 2250 Bradley St Somerville 45 Mass (11)
Ceiling Materials Co 1035 Firestone Blvd Memphis Tenn (10)
Centralite Co Inc Dayton & Central Aves Cincinnati 14 Ohio (2)
Century Lighting Inc 521 W 43 St New York 36 NY (1-13-15)
Clean Sweep Co 6534½ Whittier Blvd Los Angeles 22 Calif (14)
Cold Cathode Lighting Corp 76 S Bayles Ave Port Washington NY (4-7-8-13)
Cole (C W) & Co Inc P O Box 3382 Los Angeles 54 Calif (1-2-13-15)
Colonial Electric Products Div Colonial Neon Co Inc 1-115 Market St East Paterson NJ (2)
Columbia Electric & Mfg Co North 2310 Fancher Way Spokane Wash (2-9-10-13)
Comaco Corp 1800 N Spaulding Ave Chicago 47 Ill (1-2-13)
Condi-Lite Corp 889 Broadway New York 3 NY (1-2)
Control Switch Div Controls Co of America 4218-30 W Lake St Chicago 24 Ill (12)
Cooper Hewitt Electric Co 720-732 Grand St Hoboken NJ (2-3)

●**CROUSE-HINDS CO Syracuse 1 NY (1-2-3-7-8-9-11-13)—ADV PG 4th COVER**

Crownlite Fluorescent Co 7 Roselle St Mineola NY (2-10-13)
Curtis Lighting Div Curtis-All Brite Lighting Inc 6135 W 65 St Chicago 38 Ill (1-2-3)
Cuttler-Hammer Inc 228 N 12 Street Milwaukee 1 Wisc (12)
Cutler Light Mfg Co 2026 N 22 St Phila 21 Pa (4-13)

●**DAY-BRITE LIGHTING INC 6260 N Broadway St Louis 15 Mo (1-2-8-11)—ADV PG 82, 83**

Derrick Light & Equipment Co 1201 E Daggett (P O Box 414) Fort Worth Tex (7-8-9)
Dialight Corp 60 Stewart Avenue Brooklyn 37 NY (18)
Drake Mfg Co 4626 N Olcott Harwood Heights Chicago 31 Ill (12)
Dual-Lite Co Inc Newtown Conn (14-18)
Duray Fluorescent Mfg Co 3318 W Montrose Ave Chicago 18 Ill (2)
Duro-Test Corp 2321 Hudson Blvd North Bergen NJ (1-2-11-13)
Dynaseal Lighting Corp 5 Hadley St Cambridge 40 Mass (14)
E J S Lighting Corp 321 E Pico Blvd Los Angeles 21 Calif (1)
Electric Cord Co 432 Plane St Newark 2 NJ (11-14)
Electric Lighting Sales Inc P O Box 1907 Stockton Calif (2-13)
Electric Re-Light Co 625 S Goodman St Rochester 20 NY (2)
Electro Lighting Corp 1535 Paulina St Chicago 8 Ill (1-2-3-10)
Electro-Snap Switch & Mfg Co 4218-30 W Lake St Chicago 24 Ill (12)
Emerson-Pryne Co Towne Ave at Monterey (P O Box 698) Pomona Calif (1-13)
Ender-Monarch Corp 141 Lanza Ave Garfield NJ (1-2-4-10)
Ericson Mfg Co 1660 Hayden Ave Cleveland 12 Ohio (8)
Everglow Lighting Fixture Co Inc 332 E Jericho Turnpike Huntington Station NY (1-2)
Fannon (John J) Co 3000 E Woodbridge Detroit 7 Mich (10)
Federal Lighting Corp 1425 Rockwell Ave Cleveland 14 Ohio (1-2)
Federal Sign & Signal Corp 13626 S Western Ave Blue Island Ill (11)
Felco Products Inc 8700 Ambassador Row Dallas 19 Tex (2)
Flexo International Corp 3720 N Milwaukee Ave Chicago 41 Ill (1-2)
Fluores-O-Lite Co Evans Terminal North Broad St Hillside 5 NJ (1-2-13)
Fluorescent Equipment & Mfg Co 5105 Cowan Ave Cleveland 27 Ohio (1-2-13)
Fluorescent Fixtures of California 352 Shaw Rd South San Francisco Calif (2)
Frink Corp 211 63rd St Brooklyn 20 NY (1-2-18)
Frisbie (H C) Co 1120 E Pico Blvd Los Angeles 21 Calif (1)
Fullerton Mfg Co Willard Rd Norwalk Conn (1-2-10)
Garcy Lighting Div Garden City Plating & Mfg Co 2475 Elston Ave Chicago 47 Ill (1-2-13)
Gedney Electric Co Americas Bldg Radio City NY 20 NY (8)
General Lighting Co 248 McKibbin St Brooklyn 6 NY (1-2-13)
Gibson Mfg Co 1919 Piedmont Circle NE Atlanta Ga (2)
Gleason Sales Co Inc 5809 W Montrose Ave Chicago 34 Ill (1)
Globe Lighting Products Inc 1710 Flushing Ave Brooklyn 37 NY (1-2-13)

●**GOOD MFG CO INC 1015 N Halsted St Chicago 22 Ill (2)—AD PG 134**

●**GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (1-2)—AVD PG 2**

Great Northern Mfg Corp 1056 N Wood St Chicago 22 Ill (2-13)
Gruber Bros Inc 125 South First St Brooklyn 11 NY (1-2-9-13)
Guth (Edwin F) Co 2615 Washington Blvd St Louis 3 Mo (1-2-3-9-13-15)
Hasco Electric Corp 30 Grove Ave New Rochelle NY (1-2-13)
Holophane Co Inc 342 Madison Ave New York 17 NY (1-2-3-8-9-10)
House-O-Lite Corp 2430 S Ashland Ave Chicago 8 Ill (2-13-14)
Hub Electric Co 2255 W Grand Ave Chicago 12 Ill (1-2-11-15)
Ideal Industries Inc 5136 Park Ave Sycamore Ill (8)
Illuminating Engineering Co 2347 East Nine Mile Rd Hazel Park Mich (4)
Industrial Devices Inc Edgewater 19 NJ (12)
Integrated Ceilings Inc 11766 W Pico Blvd Los Angeles 64 Calif (10)
International Lighting Mfg Co 1825 N 19 St St Louis 6 Mo (1-2)
Jackson Electrical Co 900 W Van Buren St Chicago 7 Ill (1-8-9)
Jay Lighting Mfg Co Inc 23-29 Quincy St Brooklyn 38 New York (1)
Joy Mfg Co Electrical Products Div 1201 Macklind Ave St Louis 10 Mo (9)
K-B Lighting Mfg Co 2101 Byberry Rd Phila 16 Pa (2)
Kalsan Electric Co Inc 146 Mott St Oceanside LI NY (1-2-11-13)
Kavline Co 2480 E 22 St Cleveland 15 Ohio (1-2)
Kelly Specialty Co 5958-60 Washington Blvd Chicago 44 Ill (11)
Kenbert-Arpag Co 220 Coster St Bronx 59 NY (2)
Kent Lighting Corp 500 Johnson Ave Brooklyn 37 NY (1-2-10-13)
Keystone Electric Mfg Co 2228 E Tioga St Phila 34 Pa (2-13)

●**KILLARK ELECTRIC MFG CO 3940 Easton Ave St Louis 13 Mo (1-3-7-8-9-12-13)—ADV PG 86-87**

Kirkland (H R) Co 8 King St Morristown NJ (11-12)
Kirlin Co 3435 E Jefferson Ave Detroit 7 Mich (1-2-13)
Kliegl Bros Universal Electric Stage Lighting Co Inc 321 W 50 St NY 19 NY (1-2-14-15)
Klialite Mfg Co 316 Delancey St Phila 6 Pa (2-13)
Koch & Lowy Inc 201 E 34 St New York 16 NY (1)
Kord (Leonard E) Co P O Box 55424 Indianapolis 5 Ind (1-2)
Kurtzon (Maris) Inc 1420 S Talman Ave Chicago 8 Ill (1-2-11-13)
LAM Inc 414 Main St Wakefield Mass (1-2-16-17-19)
Larco Inc Route 20 East Painesville Ohio (9-11)
Leecraft Mfg Co Inc 58 Greene St New York 12 NY (12)
Light & Power Utilities Corp 1035 Firestone Blvd Memphis 7 Tenn (2-13)
Lightalarms Inc 95 Atlantic Ave Brooklyn 1 NY (14)
Lighting Dynamics Inc 300 N Baldwin Park Blvd City of Industry Calif (1-2-13)
Lighting Products Inc 1549 Park Ave West Highland Park Ill (2)
Lightmore Appliance Corp 651-5 Driggs Ave Brooklyn 11 NY (21)
Lightolier Inc 346 Claremont Ave Jersey City 5 NJ (1-2)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (1-2)
Litecontrol Corp 36 Pleasant St Watertown 72 Mass (1-2-13)
Litecraft Mfg Corp 100 Dayton Ave Passaic NJ (1-2-8-9-10-13)
Lithonia Lighting Products Co Box 206 Conyers Ga (2-13)
Luminous Ceilings Inc 3701 N Ravenswood Ave Chicago 13 Ill (2-10-13)
Luxor Lighting Products Inc 350 5th Ave New York 1 NY (1-2)
Magni Flood Inc 50 Crary Ave Mt Vernon NY (13)
Major Equipment Co Inc 4603 W Fullerton Ave Chicago 39 Ill (15)
Manning (RA) Co Inc 1810 North Ave Sheboygan Wisc (16-19)
Marco Industries 207 S Helena St Anaheim Calif (11-12)
Markstone Mfg Co 1531 N Kingsbury Chicago 22 Ill (1-2)
Marlou Lights Inc Fanwood NJ (2)
Marvel Lamp Co 307 Newark St Hoboken NJ (13)
Masterlite Mfg Co 2758 Kensington Ave Phila Pa (2)
McPhilben Mfg Co Inc 1329 Willoughby Ave Brooklyn 37 NY (1-2-3-8-9)
Melerjohan-Wengler 1102 W 9th St Cincinnati 3 Ohio

●**METALCRAFT PRODUCTS CO INC 6225 State Rd Philadelphia 35 Pa (2)—ADV PG 141**

Mid-West Chandelier Co 15th & Gentry (P O Box 7365) North Kansas City 16 Mo (2-13)
Midwest Lighting Products Co P O Box 536, Edgewater Branch Cleveland 7 Ohio (1)
Miller Co Illuminating Div 99 Center St Meriden Conn (1-2-3-8-9)
MiroFlector Co Inc 40 Bayview Ave Inwood LI NY (1-13-15)
Mitchell Lighting Div Compco Corp 1800 N Spaulding Ave Chicago 47 Ill (1-2-13)
Modern Light Co Inc 7809 Maplewood Industrial Court St Louis 17 Mo (2)
Moe Light Div Thomas Industries Inc 410 S 3rd St Louisville Ky (1-2-13)
Moldcast Mfg Co 236 South St Newark 5 NJ (1-3)
Mole-Richardson Co 937 N Sycamore Ave Hollywood 38 Calif (5)
Multi Electric Mfg Inc 4223 W Lake St Chicago 24 Ill (1-2-3-8-9)
N L Corp 2480 E 22 St Cleveland 15 Ohio (1-13)
Natale Machine & Tool Co 339 Highway #17 Carlstadt NJ (1)
National Cathode Corp 317 E 34 St New York 16 NY (4-10)
Nemco Electric Co 210 Second Ave Seattle 4 Wash (1-2-11-13)
Neo-Ray Products Inc 315 E 22 St NY 10 NY (1-2-10-13-15)
Nepo Mfg Co 4230 N Sayre Chicago 34 Ill (13)
Nicad Div Gould-National Batteries Inc Easthampton Mass (14)
Noel Mfg Co 3 W 18 St New York 11 NY (1)
Northern Incandescent Lamp Co 1 Newark St Hoboken NJ (1)
Northern Light Co 1661 N Water St Milwaukee 2 Wis (2-10-13)
Overbagh & Ayres Mfg Co 411 S Clinton St Chicago 7 Ill (1-8)
Palco Mfg Co 1260 Pennsylvania Ave San Francisco 7 Calif (17)
Paramount Industries Inc G-1080 Ballanger Rd Flint 4 Mich (2)
Penetray Corp 615 Front St Toledo 5 Ohio (1-13-15)
Penn (Wm) Fluorescent Light Mfg Co 1228 N 31 St Philadelphia 21 Pa (2-13)
Perfeclite Co 1457 E 40 St Cleveland 3 Ohio (1-8-18)
Perfect-Line Mfg Corp Old Country Rd & Railroad Ave P O Box 65 Hicksville NY (8-9-13)
Phillips (Oscar) Co 9701 Reading Rd (Box 21) Cincinnati 15 Ohio (2-13)
Pittsburgh Reflector Co Oliver Bldg Mellon Square Pittsburgh 22 Pa (1-2-10-13)
Portable Light Co Inc 216 William St NY 38 NY (11-14)
Prescolite Mfg Corp 2229 Fourth St Berkeley 10 Calif (1-13-18)
Price Bros Inc 4301 W Madison St Chicago 24 Ill (11)
Project Fixture Mfg Corp 55 Ongley St Rockville Centre NY (1-11)
Pyle-National Co 1344 N Kostner Ave Chicago 51 Ill (7-8-9-11-12)
Quadrangle Mfg Co 32 S Peoria St Chicago 7 Ill (1-3-8-9-11-13)
Quaker City Electric Mfg Co 2810 E Pacific St Phila 34 Pa (2-13)
Rab Electric Mfg Co Inc 605 E 132 St New York 54 NY (7-8)
Rambusch Decorating Co 40 W 13 St New York 11 NY (1-2)
Revere Electric Mfg Co 7420 N Lehigh Ave Chicago 48 Ill (1-2)
Ruby-Phillte Corp 32-02 Queens Blvd L I C 1 NY (1-2)
Russell & Stoll Co Inc 125 Barclay St NY 7 NY (7-8-9)
Scranton Storage Battery Corp Archbald Pa (14)
Segil (L J) Co 2500 W North Ave Chicago 47 Ill (2-13)
Sentry-Lite & Battery Div Hobby & Brown Electronic Corp 237 Sunrise Highway Rockville Centre NY (14)
Shalda Mfg Co Inc 156 W Providencia Ave Burbank Calif (1-3-8-9-11-13-14)
Silvray Lighting Inc 100 W Main St Bound Brook NJ (1-2-13)
Simes Co Inc 114 15th Ave College Point LI NY (1-2-3-8-9-11-17)
Sireno Co Inc 214 William St New York 38 NY (11)
Smithcraft Lighting 217 Everett Ave Chelsea 50 Mass (2-10)
Smoot-Holman Co 321 N Eucalyptus Ave (P O Box 4097) Inglewood Calif (1-2-3-8-9)
Solar Light Mfg Co 400 N Ashland Chicago 22 Ill (1-2-13)

Solux Corp 58-17 28th Ave Woodside 77 LI NY (1-2-8-11-13)
Southeast Lighting Inc 521 E 20 St Charlotte 1 NC (2)
Spero Electric Corp 20500 St Clair Ave Cleveland 17 Ohio (1-3-8-12)
Stabrite Fluorescent Mfg Co 3550 Northwest 49 St Miami Fla (1-2-13)
Stamford Metal Specialty Co Inc 429 W Broadway New York 12 NY (1-2)
Standard Electric Time Co 89 Logan St Springfield 2 Mass (14)
Standard Portable Cord Co Inc Mayville NY (14)
Steber Mfg Co 2700 Roosevelt Rd Broadview Ill (1-8-13)
Sternberg Mfg Co 4510 Addison St Chicago 41 Ill (1-16)
Stocker & Yale Inc Green St Marblehead Mass (2-9-13)
Stonco Electric Products Co 333 Monroe Ave Kenilworth NJ (1-3-8-14-15)
Sun-Lite Mfg Co 2555 Bellevue Ave Detroit 7 Mich (1-2-13)
Sunbeam Lighting Co 777 E 14 Pl Los Angeles 21 Calif (1-2-13-17)
Superior Electric Co 83 Laurel St Bristol Conn (15)
Surrette Storage Battery Co Inc Jefferson Ave Salem Mass (14)
Suttle Equipment Corp 135 S LaSalle St Chicago 3 Ill (12)
Swedish Iron & Steel Corp 910 Westfield Ave Elizabeth NJ (2)
Swiveller Co Inc Nanuet NY (1-2-13)
Sylvania Electric Products Inc 1740 Broadway NY 19 NY (1-2-12)
Tedcar Products Co Box 1209 Union NJ (11)
Tod Lite Inc 3401 NW 10th St Oklahoma City Okla (14)
Transolite Corp 550 Fifth Ave New York 36 NY (2-10)
Tri-Part Mfg Co 925 Cherry St Detroit 1 Mich (2-8-13)
Trippe Mfg Co 133 N Jefferson St Chicago 6 Ill (11)
U-C-Lite Mfg Co 1050 W Hubbard St Chicago 22 Ill (11)
Ultra-Violet Products Inc 5114 Walnut Grove Ave San Gabriel Calif (13)
Union Insulating Co Inc Box 351 Parkersburg W Va (8-9)
United Lighting & Ceiling Co 2828 Ford St Oakland 1 Calif (10-19)
United States Radium Corp Hanover Ave Morristown NJ (11-12-14)
V V Fitting Co P O Box 1253 Merchantville NJ (8-9)
Versen (Kurt) Co 4 Slocum Ave Englewood NJ (1-13-17)
Virden (John C) Co 5009-6103 Longfellow Ave Cleveland 3 Ohio (2)
Voigt Co 1636 N Carlisle St Phila 21 Pa (16-18)
Wakefield Co 731 S Water St Vermilion Ohio (1-2-10)
Webb Electric Mfg Co 1701 SW Jefferson St Portland 1 Ore (1)
Weiss and Biheller Merchandise Corp 584 Broadway NY 12 NY (1)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (7-12-15-16-17-19)
Westinghouse Electric Corp Lighting Div 1216 W 58th St (P O Drawer 5817) Cleveland 1 Ohio (1-2-3-8-9-13)
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1-2-3-8-9)—ADV PG 2nd COVER
Wheeler Reflector Co 275 Congress St Boston 10 Mass (1-2-3-8-9-13)
White (O C) Sales Co 40 Green St Marblehead Mass (1-2)
Wiley (R & W) Inc Dearborn & Bridge St Buffalo 7 NY (2)
Williams (H E) Products Co 106 S Main St Carthage Mo (2-13)
Wilmot Castle Co 1928 E Henrietta Rd Rochester NY (17)
Wilson (J A) Lighting & Display Inc 1502 Industrial Dr Erie Pa (1-10)
Wiremold Co Hartford 10 Conn (13)
Woodhead (Daniel) Co 15 N Jefferson St Chicago 6 Ill (8)
Woodward Machine Co Lighting Div 4833 Elmhurst Detroit 4 Mich (8-9)
Work-O-Lite Co 522 Cortlandt St Belleville 9 NJ (2-13)

9D. OUTDOOR LIGHTING EQUIPMENT

1. Airport lighting
2. Floodlights
3. Beacons & Searchlights
4. Spotlights
5. Street & highway lighting
6. Lighting towers, poles & standards
7. Sign lighting
8. Obstruction lighting
9. Traffic signals & controls
10. Service station lighting
11. Marine lighting
12. Underwater lighting
13. Parking and area lighting
14. Bridge lighting

Equipment manufactured for specialized commercial and residential applications. Residential outdoor lighting is included in Residential Lighting.

Abolite Lighting Div Jones Metal Products Co West Lafayette Ohio (2)
Abrams Lighting 785 Schuylkill Ave Philadelphia 46 Pa (4)
Afco Lite Corp 1378 N Wolcott Chicago 22 Ill (2)
Alexander-Tagg Industries Inc Jacksonville Road at Summit Ave Hatboro Pa (4)
American Concrete Corp 5092 N Kimberly Ave Chicago 30 Ill (6)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 Ill (2)
Art Metal Co 1814 E 40 St Cleveland 3 Ohio (2-4)
Beckley Electric Co Inc 468-470 Grand Ave Brooklyn 38 NY (2-4)
Benjamin Div Thomas Industries Inc 207 E Broadway Louisville 2 Ky (2-5)
Canning-Pekara Inc 2144 N Wood St Chicago 14 Ill (2)
Carpenter Mfg Co 2250 Bradley St Somerville 45 Mass (8)
Cold Cathode Lighting Corp 76 S Bayles Ave Port Washington NY (5)
Cole (C W) & Co Inc P O Box 3382 Los Angeles 54 Calif (4)
Colonial Electric Products Div Colonial Neon Co Inc 1-115 Market St East Paterson NJ (5-6-10-13)
Columbia Electric & Mfg Co North 2310 Fancher Way Spokane Wash (2-7-10)
Compco Corp 1800 N Spaulding Ave Chicago 47 Ill (2-5-10-13)
Cope (T J) Div Rome Cable Corp Third & Walnut Sts Collegeville 5 Pa (5)
Crouse-Hinds Co Syracuse 1 NY (1 thru 5)
Cutler Electrical Products Inc 5524 Haverford Ave Philadelphia Pa (7)
Derrick Light & Equipment Co 1201 E Daggett (P O Box 414) Fort Worth Tex (2)
Duro-Test Corp 2321 Hudson Blvd North Bergen NJ (2)
Electric Lighting Sales Inc P O Box 1907 Stockton Calif (5-10)
Electro Lighting Corp 1535 Paulina St Chicago 8 Ill (2-4)
Elreco Corp 2000 Central Ave Cincinnati 14 Ohio (6)
General Electric Co Apparatus Sales Div Schenectady 5 NY (2-3-5)
Globe Lighting Products Inc 1710 Flushing Ave Brooklyn 37 NY (4)
●GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (1-3-5)—ADV PG 2
Great Northern Mfg Corp 1065 N Wood St Chicago 22 Ill (2-5)
Guardian Light Co 500 N Blvd Oak Park Ill (5-6)
Guth (Edwin F) Co 2615 Washington Blvd St Louis 3 Mo (2)
Holophane Co Inc 342 Madison Ave New York 17 NY (2-5)
House-O-Lite Corp 2430 S Ashland Ave Chicago 8 Ill (2-4)
Hub Electric Co 2255 W Grand Ave Chicago 12 Ill (4)
Hubbard & Co 6301 Butler St Pittsburgh 1 Pa (1-2-5)
Hughey & Phillips Inc 3200 North San Fernando Blvd Burbank Calif (1-8)
Jackson Electrical Co 900 W Van Buren St Chicago 7 Ill (2-4-13)
Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 Ill (5)
Joy Mfg Co Electrical Products Div 1201 Mackiind Ave St Louis 10 Mo (2-4)
Joy Mfg Co H W Oliver Bldg Pittsburgh 22 Pa (2)
K-B Lighting Mfg Co 2101 Byberry Rd Phila 16 Pa (2)
Kalsan Electric Co Inc 146 Mott St Oceanside LI NY (4)
Kavline Co 2480 E 22 St Cleveland 15 Ohio (4)
Kenworth Co Winsted 1 Minn (2)
Kerrigan Iron Works Co 1033 Herman St Nashville 2 Tenn (5-6)
●KILLARK ELECTRIC MFG CO 3940 Easton Ave St Louis 13 Mo—(2-4-5)—ADV PG 86, 87
Kliegl Bros. Universal Electric Stage Lighting Co Inc 321 W 50 St NY 19 NY (2-4)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (1-2-3-5)
Magni Flood Inc 50 Crary Ave Mt Vernon NY (2)
Manning (RA) Co Inc 1810 North Ave Sheboygan Wis (2)
Marbelite Co Inc 179 N 10 St Brooklyn 11 NY (8)
McPhilben Mfg Co Inc 1329 Willougby Ave Brooklyn 37 NY (5)
Melerjohan-Wengler 1102 W 9th St Cincinnati 3 Ohio (5)
Metalcraft Products Co Inc 6225 State Rd Philadelphia 35 Pa (13)
Meyer Machine Inc Red Wing Minn (6)
Midwest Lighting Products Co P O Box 536 Edgewater Branch Cleveland 7 Ohio (2)
Millerbernd Mfg Co Winsted Minn (5-6)
MiroFlector Co Inc 40 Bayview Ave Inwood LI NY (2-4)
Mitchell Lighting Div Compco Corp 1800 N Spaulding Ave Chicago 47 Ill (2-13)
Modern Swimming Pool Co Inc 1 Holland Ave White Plains NY (12)
Moldcast Mfg Co 236 South St Newark 5 NJ (2-13)
●MULTI-ELECTRIC MFG INC 4223 W Lake St Chicago 24 Ill (1-2-4)—ADV PG 116
Natale Machine & Tool Co 339 Highway #17 Carlstadt NJ (2-4)
Nepo Mfg Co 4230 N Sayre Chicago 34 Ill (2-5)
Overbagh & Ayres Mfg Co 411 S Clinton St Chicago 7 Ill (2)
Penetray Corp 615 Front St Toledo 5 Ohio (2)
Perfect-Line Mfg Corp Old Country Rd & Railroad Ave P O Box 65 Hicksville LI NY (2-4)
●PFAFF & KENDALL 84 Foundry St Newark 5 NJ (5)—ADV PG 129
Philadelphia Electrical & Mfg Co 1200-36 N 31 St Phila 21 Pa (2-5-10-13)
Phillips (Oscar) Co 9701 Reading Rd (Box 21) Cincinnati 15 Ohio (2-10)
Pittsburgh Reflector Co Oliver Bldg Mellon Square Pittsburgh 22 Pa (2-4)
Project Fixture Mfg Corp 55 Ongley St Rockville Centre NY (4)
Pyle-National Co 1344 N Kostner Ave Chicago 51 Ill (2)
Quadrangle Mfg Co 32 S Peoria St Chicago 7 Ill (2)
Rab Electric Mfg Co Inc 605 E 132 St New York 54 NY (2-4)
Revere Electric Mfg Co 7420 N Lehigh Ave Chicago 48 Ill (1-2-4-5-6)
Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa (2-4)
Rostan Corp 5660 59th St Maspeth 78 LI NY (6)
Rusgreen Mfg Co 14262 Birwood Ave Detroit 38 Mich (5)
Ryther Purdy Lumber Co Inc 501 Tiffany St New York 59 NY (6)
Shalda Mfg Co Inc 156 W Providencia Ave Burbank Calif (2-4)
Simes Co Inc 114 15th Ave College Point LI NY (5-6-9-11)
Sireno Co Inc 214 Williams St New York 38 NY (3-4)
Smoot-Holman Co 321 N Eucalyptus Ave (P O Box 4097) Inglewood Calif (2)
Solar Light Mfg Co 400 North Ashland Chicago 22 Ill (2)
Spero Electric Corp 20500 St Clair Ave Cleveland 17 Ohio (2-4)
Stabrite Fluorescent Mfg Co 3550 Northwest 49 St Miami Fla (2)
Steber Mfg Co 2700 Roosevelt Rd Broadview Ill (2-4)
Sterner Industries Winsted 1 Minn (2)
Stonco Electric Products Co 333 Monroe Ave Kenilworth NJ (2-4-11-12)
Sunbeam Lighting Co 777 E 14th Pl Los Angeles 21 Calif (5)
Swiveller Co Inc Nanuet NY (2-4)
Thomoson Electric Co P O Box 873 Cleveland 22 Ohio (5)
Tod-Lite Inc 3401 N W 10 St Oklahoma City Okla (4)
Union Metal Mfg Co 1432 Maple Ave Canton 5 Ohio (5)
Utilities Service Co 1 Pine St Allentown Pa (5)
Wallace & Tiernan Inc 25 Main St Belleville NJ (1-11-14)
●WESTINGHOUSE ELECTRIC CORP P O Box 868 Pittsburgh 30 Pa (4-6-10-11-12-13)—ADV PG 4-69-70-71-72
Westinghouse Electric Corp Lighting Div 1216 W 58th St (P O Drawer 5817) Cleveland 1 Ohio (1-2-5)
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1 thru 5)—ADV PG 2nd COVER
Wheeler Reflector Co 275 Congress St Boston 10 Mass (2-5)
Wiley (R&W) Inc Dearborn & Bridge St Buffalo 7 NY (4)
Woodward Machine Co Lighting Div 4833 Elmhurst Detroit 4 Mich (2)
Work-O-Lite 522 Cortlandt St Belleville 9 NJ (2)

9E. PORTABLE LIGHTING EQUIPMENT

1. Machine & bench lights
2. Extension cord & lamp
3. Extension cord & lamp with transformer
4. Reel-type extension lamp
5. Emergency lights
6. Inspection lights

For portable lamps for residential use see "Residential Lighting."

Adjustable Fixture Co 104 E Mason St Milwaukee 2 Wis (1)
Arco Mfg Co 1701 13th Ave North (Box 817) Grand Forks ND (1)
Benjamin Div Thomas Industries Inc 207 E Broadway Louisville 2 Ky (1)
Benjamin Electric Mfg Co Northwest Highway & Seegers Rd Des Plaines Ill (1-2)
Burton Mfg Co 2520 Colorado Ave Santa Monica Calif (1)
Carpenter Mfg Co 2250 Bradley St Somerville 45 Mass (5)
Commercial Reflector & Mfg Co 3109 Maple Ave Los Angeles 11 Calif (6)
Compco Corp 1800 N Spaulding Ave Chicago 47 Ill (2)
Cordomatic Div Vacuum Cleaner Corp of America 1724 W Indiana Ave Phila 32 Pa (4)
Crouse-Hinds Co Syracuse 1 NY (1-2)
Day-Ray Products Inc 1133 Mission St South Pasadena Calif (2-3)

Ericson Mfg Co 1660 Hayden Ave Cleveland 12 Ohio (2-3-4)
Flexo International Corp 3720 N Milwaukee Ave Chicago 41 Ill (1)
Fostoria Pressed Steel Corp N Main St Fostoria Ohio (1)
Gardner Products Co 15244 Aubrey Detroit 39 Mich (1)
Industrial Electrical Works Inc 1509 Chicago St Omaha 2 Neb (4)
Joy Mfg Co Electrical Products Div 1201 Mackfind Ave St Louis 10 Mo (2-3)
Joy Mfg Co H W Oliver Bldg Pittsburgh 22 Pa (2-3)
Koch & Lowy Inc 201 E 34 St New York 16 NY (4)
Koehler Mfg Co 395 Lincoln St Marlboro Mass (5)
McGill Mfg Co Inc Valparaiso Ind (2)
Michigan Fluorescent Light Div 393 Orchard Lake Ave Pontiac Mich (1)
Murray (O A) Co Inc 632 N Mill St Tipton Ind (2)
Natale Machine & Tool Co 339 Highway #17 Carlstadt NJ (2)
Project Fixture Mfg Corp 55 Ongley St Rockville Centre NY (2)
Pyle-National Co 1344 N Kostner Ave Chicago 51 Ill (2)
Royal Electric Corp 95 Grand Ave Pawtucket RI (2)
Sireno Co Inc 214 William St New York 38 NY (5)
Standard Portable Cord Co Inc Mayville NY (1-2)
Stocker & Yale Inc Green St Marblehead Mass (1-2-3-6)
Stonco Electric Products Co 333 Monroe Ave Kenilworth NJ (2)
Sun-Lite Mfg Co 2555 Bellevue Ave Detroit 7 Mich (1)
Surrette Storage Battery Co Inc Jefferson Ave Salem Mass (5)
Swiveller Co Inc Nanuet NY (1-2)
●U-C-LITE MFG CO 1050 W Hubbard St Chicago 22 Ill (5)—ADV PG 143
Vimco Mfg Co Inc Main St Holland NY (1)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1)
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1 thru 5)—ADV PG 2nd COVER
White (O C) Sales Co 40 Green St Marblehead Mass (1)
Woodhead (Daniel) Co 15 N Jefferson St Chicago 6 Ill (2-3-4)
Woodward Machine Co Lighting Div 4833 Elmhurst Detroit 4 Mich (1)

9F. GASEOUS DISCHARGE LAMPS

1. **Arc**
2. **Cold cathode**
3. **Fluorescent**
4. **Mercury vapor**
5. **Sodium vapor**

Light sources only; fixtures are listed under "Portable Lamps" and "Residential Lighting."

Amplex Corp Glen Cove Rd Carle Place Long Island NY (3-4)
Champion Lamp Works 330 Lynnway Lynn Mass (3)
Cold Cathode Lighting Corp 76 S Bayles Ave Port Washington NY (2)
Cooper Hewitt Electric Co 720-732 Grand St Hoboken NJ (3-4)
Duro-Test Corp 2321 Hudson Blvd North Bergen NJ (2-3-4)
General Electric Co Lamp Div Large Lamp Dept Nela Park Cleveland Ohio (3-4)
●GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (3)—ADV PG 2
Illuminating Engineering Co 2347 East Nine Mile Rd Hazel Park Mich (2)
Luxor Lighting Products Inc 350 5th Ave New York 1 NY (2-3-4)
Marvel Lamp Co 307 Newark St Hoboken NJ (3)
National Cathode Corp 317 E 34 St New York 16 N Y (2)
Penetray Corp 615 Front St Toledo 5 Ohio (3-4)
Pollak Luminescent Corp 732 S Federal St Chicago 5 Ill (2)
Radiant Lamp Corp 300 Jelliff Ave Newark 8 NJ (4)
Solar Electric Corp 121 Central Ave Warren Pa (3)
Suclar Laboratories Inc 1197 McCarter Highway Newark NJ (3)
Supro Lux Mfg Co Inc 406-416 E 161 St New York 51 NY (2-3)
Swedish Iron & Steel Corp 910 Westfield Ave Elizabeth NJ (2)
Sylvania Electric Products Inc 1740 Broadway NY 19 NY (1-2-3)
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1 thru 5)—ADV PG 2nd COVER

9G. FILAMENT LAMPS

1. **Clear or frosted**
2. **Colored**
3. **Glow (neon & argon)**
4. **Infrared**
5. **Ultra-violet**
6. **Insect repellent**
7. **Miniature**
8. **Reflector flood & PAR**
9. **Sealed beam**
10. **Decorative**
11. **Quartz**
12. **Traffic signal**
13. **Shock-resistant**
14. **Series street lighting**

Light sources only; fixtures are listed under "Portable Lamps" and "Residential Lighting."

Aerolux Lights Corp 653 11th Ave New York 36 NY (2-3-5-10)
Amplex Corp Glen Cove Rd Carle Place Long Island NY (1-2-4-6-8-9)
Champion Lamp Works 330 Lynnway Lynn Mass (1-2-4-6-8-10)
Chicago Miniature Lamp Works 1500 N Ogden Ave Chicago 10 Ill (1-2-3-7-9)
Cold Cathode Lighting Corp 76 S Bayles Ave Port Washington NY (5)
Dialight Corp 60 Stewart Ave Brooklyn 37 NY (3-7)
Drake Mfg Co 4626 N Olcott Harwood Heights Chicago 31 Ill (3-7)
Duro-Test Corp 2321 Hudson Blvd North Bergen NJ (1-2-4-6-8)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (4)
Elite Glass Co Inc 111 W 22nd St New York 11 NY (1)
General Electric Co Lamp Div Large Lamp Dept Nela Park Cleveland Ohio (1 thru 10)
General Electric Co Lamp Div Miniature Lamp Dept Nela Park Cleveland Ohio (1 thru 10)
Graybar Electric Co Inc 420 Lexington Ave NY 17 NY (1-2)
Hudson Lamp Co 528 Elm St Kearny NJ (3-7)
Interlectric Corp 1401 Lexington Ave Warren Pa (1-6-8)
Luxor Lighting Products Inc 350 5th Ave New York 1 NY (1-2-4-6-8-9-12-13-14)
Marco Industries 207 S Helena St Anaheim Calif (3-7)
Marvel Lamp Co 307 Newark St Hoboken NJ (1-2-4-6-8)
Natale Machine & Tool Co 339 Highway #17 Carlstadt NJ (8)
●NORTH AMERICAN ELECTRIC LAMP CO 1520 North 13th St St Louis 6 Mo (2-4-7-10)—ADV PG 126
Northern Incandescent Lamp Co 1 Newark St Hoboken NJ (1-2-4-6)
Penetray Corp 615 Front St Toledo 5 Ohio (1-2-4-5-6-8)
Pyrosil Inc 1889 Front St Cuyahoga Falls Ohio (4)
Radiant Lamp Corp 300 Jelliff Ave Newark 8 NJ (1-4-8-9)
Signalite Inc 37-41 Neptune Highway Neptune NJ (3)
Solar Electric Corp 121 Central Ave Warren Pa (1-2-4-6)
Star-A Electric Mfg Co Inc 269 Meserole St Brooklyn 6 NY (1-6-8)
Sylvania Electric Products Inc 1740 Broadway NY 19 NY (1-2-3-4-7-8)
Ultra-Violet Products Inc 5114 Walnut Grove Ave San Gabriel Calif (5)
Weiss and Biheller Merchandise Corp 584 Broadway NY 12 NY (10)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (11)
Westinghouse Electric Corp Lamp Div Bloomfield NJ (1 thru 9)
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1-2)—ADV PG 2nd Cover

9H. LIGHTING SYSTEM ACCESSORIES

1. **Reflectors**
2. **Louvers & diffusers**
3. **Glassware**
4. **Panels**
5. **T-bars & supports**
6. **Gimbal rings**

For use with suitable sockets or fixtures or for area and ceiling lighting systems.

Abolite Lighting Div Jones Metal Products Co West Lafayette Ohio (1-2)
Abrams Lighting 785 Schuylkill Ave Philadelphia 46 Pa (1)
Acme Lighting & Mfg Co 949 E 31 St Los Angeles 11 Calif (1)
Adalet Mfg Co 14300 Lorain Ave Cleveland 11 Ohio (1-2)
Afco Lite Corp 1378 N Wolcott Chicago 22 Ill (1)
Alexander-Tagg Industries Inc Jacksonville Road at Summit Ave Hatboro Pa (6)
All-Brite Light Co 400 S 12 St Reading Pa (1)
●AMERICAN LOUVER CO 5308 N Elston Ave Chicago 30 Ill (2)—ADV PG—103
Artcraft Lighting Co Inc 248 McKibben St Brooklyn 6 NY (1)
B M D & R Inc 7020 Walker St St Louis Park Minneapolis 16 Minn (1)
Benjamin Div Thomas Industries Inc 207 E Broadway Louisville 2 Ky (1)
Canning-Pekara Inc 2144 N Wood St Chicago 14 Ill (1-2)
Capitol Stage Lighting Co Inc 527 W 45 St New York 36 NY (1)
Ceiling Materials Co 1035 Firestone Blvd Memphis Tenn (5)
Cold Cathode Lighting Corp 76 S Bayles Ave Port Washington NY (1)
Cole (C W) & Co Inc P O Box 3382 Los Angeles 54 Calif (1)
Columbia Electric & Mfg Co North 2310 Fancher Way Spokane Wash (2)
Compco Corp 1800 N Spaulding Ave Chicago 47 Ill (1)
Corning Glass Works Corning NY (3-4)
Crownlite Fluorescent Co 7 Roselle St Mineola NY (1)
Curtis Lighting Div Curtis-All Brite Lighting Inc 6135 W 65 St Chicago 38 Ill (1)
Cutler Light Mfg Co 2026 N 22 St Phila 21 Pa (1)
Derrick Light & Equipment Co 1201 E Daggett (P O Box 414) Fort Worth Tex (1)
Electro Lighting Corp 1535 Paulina St Chicago 8 Ill (1)
Erie Glass Mfg Co 564 Union Trust Bldg Pittsburgh 19 Pa (3)
Frink Corp 211 63rd St Brooklyn 20 NY (1-2)
General Lighting Co 248 McKibbin St Brooklyn 6 NY (1)
Great Northern Mfg Corp 1056 N Wood St Chicago 22 Ill (1)
Gruber Bros Inc 125 South First St Brooklyn 11 NY (1)
Guth (Edwin F) Co 2615 Washington Blvd St Louis 3 Mo (1-2)
Hexcel Products Inc 2332 4th St Berkeley 10 Calif (2)
Holophane Co Inc 342 Madison Ave New York 17 NY (1-3)
House-O-Lite Corp 2430 S Ashland Ave Chicago 8 Ill (1-2)
Ideal Industries Inc 5136 Park Ave Sycamore Ill (1)
Jackson Electrical Co 900 W Van Buren St Chicago 7 Ill (1)
K-B Lighting Mfg Co 2101 Byberry Rd Phila 16 Pa (1)
Keystone Electric Mfg Co 2228 E Tioga St Phila 34 Pa (1)
Killark Electric Mfg Co 3940 Easton Ave St Louis 13 Mo (1)
Kliegl Bros Universal Electric Stage Lighting Co Inc 321 W 50 St NY 19 NY (1)
Kurtzon (Morris) Inc 1420 S Talman Ave Chicago 8 Ill (1)
Lancaster Glass Corp Lancaster Ohio (3)
Lee-Bert Inc 900 Lapeer St Saginaw Mich (4)
Light & Power Utilities Corp 1035 Firestone Blvd Memphis 7 Tenn (1)
Lightonics P O Box 7211 Oakland 1 Calif (2-4)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (1)
McKee Div Thatcher Glass Mfg Co Inc Jeannette Pa (3)
Mid-West Chandelier Co 15th & Gentry (P O Box 7365) North Kansas City 16 Mo (3)
Midwest Lighting Products Co P O Box 536 Edgewater Branch Cleveland 7 Ohio (1)
Miller Co Illuminating Div 99 Center St Meriden Conn (1-2)
MiroFlector Co Inc 40 Bayview Ave Inwood LI NY (1)
Modern Light Co Inc 7809 Maplewood Industrial Court St Louis 17 Mo (1)
Multi Electric Mfg Inc 4223 W Lake St Chicago 24 Ill (1)
National Cathode Corp 317 E 34 St New York 16 NY (1)
Overbagh & Ayres Mfg Co 411 S Clinton St Chicago 7 Ill (1)
Pittsburgh Reflector Co Oliver Bldg Mellon Square Pittsburgh 22 Pa (1)
Quadranole Mfg Co 32 S Peoria St Chicago 7 Ill (1)
Rab Electric Mfg Co Inc 605 E 132 St New York 54 NY (1)
Ruhv-Philite Corp 32-02 Queens Blvd LIC 1 NY (1-2)
Russell & Stoll Co Inc 125 Barclay St NY 7 NY (1)
Spero Electric Corp 20500 St Clair Ave Cleveland 17 Ohio (1)
Stabrite Fluorescent Mfg Co 3550 Northwest 49 St Miami Fla (1)
Standard Portable Cord Co Inc Mayville NY (1)
Steber Mfg Co 2700 Roosevelt Rd Broadview Ill (1)
Swiveller Co Inc Nanuet NY (1)
United Lighting & Ceiling Co 2828 Ford St Oakland 1 Calif (2-4-5)
Versen (Kurt) Co 4 Slocum Ave Englewood NJ (1-2)
Weiss and Biheller Merchandise Corp 584 Broadway NY 12 NY (3)
Westinghouse Electric Corp Lighting Div 1216 W 58th St (P O Drawer 5817) Cleveland 1 Ohio (1)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1)—ADV PG—2nd Cover
Yorkville Metal Products Co 677 Broadway NY 12 NY (1)

9J. MISCELLANEOUS LIGHT SOURCES

1. Radioisotope excited
2. Electroluminescent panels

Sylvania Electric Products Inc 1740 Broadway New York 19 NY (8)
United States Radium Corp Hanover Ave Morristown NJ (2)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (2)
Westinghouse Electric Corp Lamp Div Bloomfield NJ (2)

TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers* on the Free Information cards elsewhere in this issue.

*Code No.	Description, Pages Catalog No. & Mfr.
9-1	Lighting Equipment; 50p (Afco)
9-2	Fluorescent Lighting Units; 4p; Cat. No. FE (Benjamin)
9-3	Illuminated House Numbers; 15p (Calumet)
9-4	Floodlighting; 16p; Cat. No. 2719 (Crouse-Hinds)
9-5	Pilot Lights; 23p; Cat. No. L-161-B (Dialight)
9-6	Lighting Fixtures; 31p (Eagle)
9-7	Emergency Lighting Equipment; 8p; Cat. No. LW-1 (Electric Cord)
9-8	Lighting Fixtures; 15p; Cat. No. P-60 (Federal)
9-9	Lighting Fixtures; 80p; Cat. No. 60 (Garden City)
9-10	By-Pass Lighting; 6p; Cat. No. GER-1598 (General Electric)
9-11	Lighting Design; 78p; Cat. No. GS-112 (Geringer)
9-12	Lighting Fixtures; 16p; Cat. No. R-60 (Gruber)
9-13	Lighting Fixtures; 50p (Hughey & Phillips)
9-14	Lighting Fixtures; 15p; Cat. No. 60A (Jay)
9-15	Lighting Fixtures; Cat. No. 60A (Jay)
9-16	Lighting Fixtures; 10p (Kalsan)
9-17	Floodlighting Standards; 12p; Cat. No. F2-1159 (Kerrigan)
9-18	Planning and Promoting Street Lighting; 20p; Cat. No. B1-1259 (Kerrigan)
9-19	Strain Poles for Traffic Signals; 20p; Cat. No. S2-1159 (Kerrigan)
9-20	Architectural Lighting; 34p; Cat. No. A-11 (Kliegl)
9-21	History of Stage Lighting; 11p; Cat. No. 60 (Kliegl)
9-22	Lighting Fixtures; 6p (Kliegl)
9-23	Stage Lighting; 15p (Kliegl)
9-24	Theatrical Lighting; 83p; Cat. No. T-61 (Kliegl)
9-25	Church & Building Lighting; 25p; Cat. No. 31-F-2 (Manning)
9-26	Lighting Fixtures; 53p; Cat. No. 118B (Marvin)
9-27	Lighting Designs; 11p; Cat. No. 33a-Mc (McPhilben)
9-28	Area Luminaires; 12p; Cat. No. 120 (Philadelphia Electrical)
9-29	Lighting Fixtures; 10p; Cat. No. 117 (Philadelphia Electrical)
9-30	Lighting Fixtures; Cat. No. S-23 (Prescolite)
9-31	Lighting Units; Cat. No. HO-2 (Prescolite)
9-32	Recessed Ligting Fixtures; Cat. No. CP-1 (Prescolite)
9-33	Exit & Fire Escape Signs; 13p (Price)
9-34	Lighting Fixtures; 48p; Cat. No. 104 (Progress)
9-35	Lighting Fixtures; 11p; Cat. No. MM-59 (Progress)
9-36	Radiant Lamps; 7p; Cat. No. 89 (Radiant Lamp)
9-37	Lighting Equipment; 100p (Revere)
9-38	Lighting Standards; 7p (Ryther-Purdy)
9-39	Glow Lamps; 8p (Signalite)
9-40	Architectural Lighting Fixtures; 4p; Cat. No. A (Stamford)
9-41	Modern Architectural Lighting Fixtures; 4p; Cat. No. B (Stamford)
9-42	Decorative Lighting Color Wheels; Cat. No. 1096 & 1040-59 (Steber)
9-43	Cast Aluminum Outdoor Floodlights; 8p; Cat. No. S (Stonco)
9-44	Emergency Floodlighting; 10p; Cat. No. H; (Stonco)
9-45	Recessed Lighting Fixtures; 6p; Cat. No. 31F2 (Sunbeam)
9-46	Lighting Equipment; 56p; Cat. No. C-59 (Wakefield)
9-47	Group Relamping; Cat. No. A-6832 (Westinghouse)

SECTION 10. SIGNAL, COMMUNICATING & INDICATING EQUIPMENT

Many of the indicating devices listed below are closely related to industrial processing controls listed in Section 3.

10A. METERS

1. Ammeters, voltmeters & volt-ammeters
2. Kva meters
3. Light meters
4. Demand meters
5. Fluxmeters
6. Galvanometers
7. Kilowatt-hour meters
8. Ohmmeters
9. Recording-type meters
10. Power factor meters
11. Tachometers
12. Varmeters
13. Wattmeters
14. Phase angle meters
15. Electrolysis meters
16. Frequency meters
17. Electrostatic meters
18. Vibration

Aero Instrument Co 11423 Vanowen St North Hollywood Calif (16)
Airserco Mfg Co Inc 435 Melwood St Pittsburgh 13 Pa (1)
Allen Electric and Equipment Co 2101-2117 N Pitcher St Kalamazoo Mich (1-11-12)
Anchor Mfg Co P O Box 959 Manchester NH (22)
Assembly Products Inc Chesterland 31 Ohio (1)
Associated Research Inc 3789 W Belmont Ave Chicago 18 Ill (11)
Beede Electrical Instrument Co Inc Penacook NH (1-6-8-13)
Bergen Laboratories Inc 60 Spruce St Paterson 1 NJ (1-8)
●BIDDLE (JAMES G) CO 1316 Arch St Phila 7 Pa (2-6-8-11-16)—ADV PG 108
Borden Engineering Div M J Johnson Aircraft Engineering Co Box 10 Morristown NJ (6)
●COLUMBIA ELECTRIC MFG CO 4519 Hamilton Ave Cleveland 14 Ohio (1)—ADV PG 114
Cutler-Hammer Inc 228 N 12 St Milwaukee 1 Wisc (9)
Davenport Mfg Co 2532 N Elston Ave Chicago 47 Ill (1-8)
Davis Electric Co 28 Parker St Wallingford Conn (8)
Daystrom Inc Weston Instruments Div 614 Frelinghuysen Ave Newark 12 NJ (1-2-5-6-8-10-11-13)
DeJur-Amsco Corp 4501 Northern Blvd Long Island City 1 NY (1-9)
Durant Mfg Co 1900 N Buffum St Milwaukee 1 Wis (11)
Eastern Specialty Co 3617 N 8th St Phila 40 Pa (8-14-22)
Electric Re-Light Co 625 S Goodman St Rochester 20 NY (7)
Electric Tachometer Corp 68th & Upland Sts Phila 42 Pa (11)
Electro-Mechanical Instrument Cc 8th & Chestnut Sts Perkasie Pa (1)
Electro-Mechano Co 241 E Erie St (EM) Milwaukee 2 Wis (11)
EPCO Electronics Inc 140 Liberty St NY 6 NY (1-8)
Erwood Inc 1770 Berteau Ave Chicago 13 Ill (18)
Esterline-Angus Co P O Box 596 Indianapolis 6 Ind (1-10-11-12-13-16-9)
Fisher Research Laboratory Inc 1961 University Ave Palo Alto Calif (1)
Fleron (M M) & Son 1220 Yardley Rd Morrisville Pa (8)
General Controls Co 801 Allen Ave Glendale Calif (9)
General Electric Co Apparatus Sales Div Schenectady 5 NY (1-4-5-6-7-8-9-10-11-12-13-14-16)
General Radio Co West Concord Mass (8-11)
Gray Instrument Co Mill Rd Andalusia Pa (9)
●GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (1)—ADV PG 2
Greibach Instruments Corp Metuchen NJ (1-8)
Hewson Co Inc 115 Maple St Summit NJ (8)
Hickok Electrical Instrument Co 10514 Dupont Ave Cleveland 8 Ohio (1-2-4-5-6-8-10-12-13-14-16)
Holtzer-Cabot Div National Pneumatic Co Inc 125 Amory St Boston 19 Mass (8)
Hoyt Electrical Instrument Works 42 Carleton St Cambridge 42 Mass (1-6)
Ideal Industries Inc 5136 Park Ave Sycamore Ill (11)
Industrial Devices Inc Edgewater 19 NJ (1)
Industrial Instruments Inc 89 Commerce Rd Cedar Grove NJ (2-8)
Industrial Transformer Corp Gouldsboro Pa (8)
Jones Motrola Corp 432 Fairfield Ave Stamford Conn (11)
Kay Electric Co Maple Ave Pine Brook NJ (1)
Kin Tel 5725 Kearney Villa Rd San Diego 12 Calif (1-6)
Knopp Inc 1307 66th St Oakland 8 Calif (17)
Leeds & Northrup Co 4970 Stenton Ave Phila 44 Pa (6-8-9)
Leitch-Huard Corp Stark & Commercial Sts Manchester NH (1)
Lewis Engineering Co 52 Rubber Ave Naugatuck Conn (9)
Manning Maxwell & Moore Inc 250 E Main St Stratford Conn (1)
Marion Instrument Div Minneapolis-Honeywell Regulator Co Grenier Field Manchester NH (1-22)
Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (1-11)
Meters Inc 5353 N Keystone Ave Indianapolis 20 Ind (1-2-8)
Metron Instrument Co 432 Lincoln St Denver 3 Colo (11)
Minneapolis-Honeywell Regulator Co Boston Div 40 Life St Boston 35 Mass (6)
Minneapolis-Honeywell Regulator Co Industrial Div Wayne & Windrim Aves Phila 44 Pa (1-4-6-9-10-11-12-13)
Multi-Amp Div Multi-Amp Electronic Corp 465 Lehigh Ave Union NJ (8)
Partlow Corp 230 Campion Rd New Hartford NY (9)
Peschel Electronics Inc RFD #1 Patterson NY (8)
Pyramid Instrument Corp 630 Merrick Rd Lynbrook NY (1)
Radio Frequency Laboratories Inc Boonton NJ (22)
Rattray (George) & Co 116-08 Myrtle Ave Richmond Hills 18 NY (9)
Sangamo Electric Co 11th & Converse Springfield Ill (1-2-4-7-12-13)
Sensitive Research Instrument Corp 310 Main St New Rochelle NY (1-5-6-13-16)
Shallcross Mfg Co Preston St Selma NC (2-6-8-9-15)
Shurite Meters 130 Wallace St New Haven 8 Conn (1)

Simpson Electric Co 5200 W Kinzie St Chicago 44 Ill (1-6-8-13)
Snap-on-Tools Corp 8028 28th Ave Kenosha Wis (11-21)
Southwestern Industrial Electronics Co 10201 Westheimer (P O Box 22187) Houston 27 Tex (1-6-8-11)
Standard Electric Time Co 89 Logan St Springfield 2 Mass (11)
States Co 19 New Park Ave Hartford 6 Conn (22)
●STICHT (HERMAN H) CO INC 27 Park Place New York 7 NY (1-8-11-16)—ADV PG 139
Trio Laboratories Inc Expressway Industrial Park Plainview NY (1-14)
Triplett Electrical Instrument Co 286 Harmon Rd Bluffton Ohio (1-2-8-13)
U S Gauge Div American Machine & Metals Inc Clymer Ave Sellersville Pa (1)
Wac Line Inc 35 S St Clair St Dayton 2 Ohio (1-11-16-17)
Western Electro-Mechanical Co Inc 300 Broadway Oakland 7 Calif (1-10-14)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1-2-4-6 thru 14-16)
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1-4) ADV PG 2nd Cover
Yokogawa Electric Works Inc 40 Worth St New York 13 NY (1-11)
Zernickow (O) Co 15 Park Row New York 38 NY (11)

10B. INDICATORS & ALARMS

1. Annunciators
2. Bin level
3. Blown fuse
4. Revolution
5. Current failure
6. Fault & ground
7. Photoelectric
8. Liquid level
9. Peak load
10. Phase sequence
11. Smoke
12. Synchroscopes
13. Temperature
14. Lamp failure
15. Sound level
16. Liquid-flow
17. Counting devices
18. Sprinkler alarms
19. Elapsed time
20. Fire alarm detectors

For associated controls, see "Controls" & "Control Switches" in Section 3.

Abrams Instrument Corp 606 E Shiawasee St Lansing Mich (17)
Acme Fire Alarm Company Inc 106 Seventh Ave New York 11 NY (1-6)
Acoustica Associates Inc 26 Windsor Ave Mineola NY (8)
American District Telegraph Co 155 Sixth Ave New York 13 NY (7-11-18-20)
American Sentry Inc 84 Bethlehem Pike Philadelphia 18 Pa (7-11-13)
Assembly Products Inc Chesterland 31 Ohio (13)
Associated Research Inc 3789 W Belmont Ave Chicago 18 Ill (10)
Auth Electric Co Inc 34-20 45th St LIC 1 NY (1-6)
Autocall Co 58 Warden Ave Shelby Ohio (1-16-18)
Automatic Control Co 995 University Ave St Paul 4 Minn (1-5-8-13)
Automatic Devices 714 Hillgrove Ave Western Springs Ill (13)
Automation Products Inc 3030 Max Roy St Houston 24 Tex (8)
B/W Controller Corp 2200 E Maple Rd Birmingham Mich (8)
Bailey Meter Co 1050 Ivanhoe Rd Cleveland 10 Ohio (8-11-13)
Bergen Laboratories Inc 60 Spruce St Paterson 1 NJ (19)
Biddle (James G) Co 1316 Arch St Phila 7 Pa (6)
Bin-Dicator Co 13946 Kercheval Ave Detroit 15 Mich (2)
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (8-13)
Borden Engineering Div M J Johnson Aircraft Engineering Co Box 10 Morristown NJ (6)
Brundee Co 48 Hale St Cranford NJ (6)
Brunswick Instruments P O Box 813 New Brunswick NJ (10)
Burling Instrument Co Inc 16 River Rd Chatham NJ (13)
Central Station Signals Inc 53 W 23 St New York 10 NY (5-8-11-13)
Clark Controller Co 1146 E 152 St Cleveland 10 Ohio (9-11)
Com-Pak-Ett Mfg Corp 650 Grand St Allegan Mich (17)
Convair Inc P O Box 9671 Pittsburgh 16 Pa (2)
Couch (S H) Co Inc 3 Arlington St North Quincy 71 Mass (1)
Counter & Control Corp 4503 W Brown Deer Rd Milwaukee 23 Wis (4-17)
Crouse-Hinds Co Syracuse 1 NY (6-8)
Cutler-Hammer Inc 228 N 12 St Milwaukee 1 Wisc (7-8-13)
Davenport Mfg Co 2532 N Elston Ave Chicago 47 Ill (6-10)
Daystrom Inc Weston Instruments Div 614 Frelinghuysen Ave Newark 12 NJ (13)
Dietz (Henry G) Co Inc 12-16 Astoria Blvd Long Island City 2 NY (8)
Durant Mfg Co 1900 N Buffum St Milwaukee 1 Wis (17)
Dwyer (F W) Mfg Co Woodland at Greenwood (P O Box 373) Michigan City Ind (8)
Eastern Specialty Co 3617 N 8th St Phila 40 Pa (10)
Edwards Co Inc Norwalk Conn (1-20)
Electric Tachometer Corp 68th & Upland Sts Phila 42 Pa (4)
Electro Devices Inc 4648 Easton Ave St Louis 13 Mo (1)
Electro-Mechanical Instrument Co 8th & Chestnut Sts Perkasie Pa (5)
Electronic Control Corp 1573 E Forest Ave Detroit 7 Mich (7-11)
Electronics Corp of America One Memorial Dr Cambridge Mass (7-8-11)
Ellenco Inc 3322 M St N W Washington 7 DC (1-6-11-13)
Excel Electric Service Co Inc 2113 S Western Ave Chicago 8 Ill (6)
Fenwal Inc Pleasant St Ashland Mass (13)
Fischer & Porter Co 335 Warminster Rd Hatboro Pa (1-7-8-13-16)
Fisher Research Laboratory Inc 1961 University Ave Palo Alto Calif (8)
General Controls Co 801 Allen Ave Glendale Calif (4-8-13)
General Electric Co Apparatus Sales Div Schenectady 5 NY (4 thru 13)
Glo-Lite Instrument Co 428 Peshine Ave Newark 12 NJ (6-10)
Haledy Electronics Co 57 William St NY 5 NY (7-8-16-17)
Healy-Ruff Co Water Level Controls Div 2255 University Ave St Paul 14 Minn (8)
Heat-Timer Corp 657 Broadway New York 12 NY (13)
Hewitt-Robins Inc 666 Glenbrook Rd Stamford Conn (2)
Hewson Co Inc 443 Broad St Newark 2 NJ (6)
Hickok Electrical Instrument Co 10514 Dupont Ave Cleveland 8 Ohio (13)
Hughey & Phillips Inc 3200 North San Fernando Blvd Burbank Calif (14)
Illinois Testing Laboratories Inc 420 N LaSalle St Chicago 10 Ill (13)
Industrial Devices Inc Edgewater 19 NJ (3)
Industrial Instruments Inc 89 Commerce Rd Cedar Grove NJ (2)
Instrument Laboratories 315 W Walton Pl Chicago 10 Ill (6)
Jeffrey Mfg Co 832 N 4 St Columbus 16 Ohio (2)
Jordan Co Inc 3235 West Hampton Ave Milwaukee 9 Wis (7)
Kidde Ultrasonic & Detection Alarms Inc 459 Brighton Rd Clifton NJ (7-13)
Kirkland (H R) Co 8 King St Morristown NJ (1)
Knopp Inc 1307 66th St Oakland 8 Calif (10)
Kurman Electric Co 191-193 Newel St Brooklyn 22 NY (7)
Larson Instrument Co 24 Orchard St Tarrytown NY (5-13)
Leeds & Northrup Co 4970 Stenton Ave Phila 44 Pa (6-11-13)
Magnetrol Inc 2110 S Marshall Blvd Chicago 23 Ill (8)
Manning, Maxwell & Moore Inc 250 E Main St Stratford Conn (8-13)
Marsh (Jas P) Corp 3501 Howard St Skokie Ill (13)
McDonnell & Miller Inc 3500 N Spaulding Ave Chicago 18 Ill (8)
Mechanical Industries Production Co 217-223 Ash St Akron 8 Ohio (13)
Mercoid Corp 4201 W Belmont Ave Chicago 41 Ill (13)
Minneapolis-Honeywell Regulator Co 2753 Fourth Ave S Minneapolis 8 Minn (4)
Minneapolis-Honeywell Regulator Co Industrial Div Wayne & Windrim Aves Phila 44 Pa (7-8-13)
Nelson Electric Mfg Co P O Box 5385 Tulsa Okla (6)
New Jersey Meter Co Inc 350 Leland Ave Plainfield NJ (16)
O'Brien Electric Corp 6514 Santa Monica Blvd Hollywood 38 Calif (1)
Opad Electric Co 43 Walker St New York 13 NY (10)
Panalarm Div Panellit Inc 7401 N Hamlin Ave Skokie Ill (1)
Panellit Div Information Systems Inc 7401 N Hamlin Ave Skokie Ill (1)
Parr Mfg Corp 48 Hale St Cranford NJ (6)
Partrick & Wilkins Co 51 N Seventh St Phila 6 Pa (1)
Performance Measurements Co 15301 W McNichols Detroit 35 Mich (16)
Peschel Electronics Inc RFD #1 Patterson NY (5-6)
Photobell Co Inc 43 Vesey St New York 7 NY (8-11)
Photomation Inc 96 S Washington Ave Bergenfield NJ (2-4-7-11-16)
Post Electronic Products 140 Elliott St Beverly Mass (7-17)
Pyrometer Instrument Co Bergenfield NJ (13)
Russell & Stoll Co Inc 125 Barclay St NY 7 NY (6)
Scam Instrument Corp 1811 W Irving Pk Rd Chicago 13 Ill (1)
Scott (H H) Inc 111 Powder Mill Rd Maynard Mass (15)
Scrayco Mfg Co 201 Greene Ave Middlesex NJ (2)
Sell (H H) Electric Co 3240 Dakota Ave Minneapolis 16 Minn (10)
Shallcross Mfg Co Preston St Selma NC (6)
Simmonds Aerocessories Inc Tarrytown NY (8)
Sperti Faraday Inc 1322 E Church St Adrian Mich (1)
Standard Electric Time Co 89 Logan St Springfield 2 Mass (1-4)
Stewart Bros Div Instrument Laboratories 315 W Walton Pl Chicago 10 Ill (6)
Sticht (Herman H) Co Inc 27 Park Place New York 7 NY (10-19)
Superior Interlock Corp 73-39 Central Ave Glendale 27 NY (1)
Tigerman Engineering Co 4332 N Western Ave Chicago 18 Ill (1)
Tobe Deutschmann Corp Providence Highway Norwood Mass (6)
Trimount Instrument Co 3119 W Lake St Chicago 12 Ill (8)
United Mfg Co 41 Halg St Hamden 14 Conn (10)
U S Gauge Div American Machine & Metals Inc Clymer Ave Sellersville Pa (13)
Veeder-Root Inc 70 Sargeant St Hartford 2 Conn (17)
Vemaline Products Co P O Box 222 Hawthorne NJ (17)
Viking Instruments Inc East Haddam Conn (1-8-13)
Walkirt Co 141 W Hazel St Inglewood 3 Calif (17)
Wallace & Tiernan Inc 25 Main St Belleville NJ (7-8)
Warrick (Chas F) Co 1964 W Eleven Miles Rd Berkley Mich (8)
Weksler Instrument Corp 195 E Merrick Rd Freeport LI NY (13)
West Instrument Corp 4363 W Montrose Ave Chicago 41 Ill (13)
Western Electro-Mechanical Co Inc 300 Broadway Oakland 7 Calif (10)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1-6-7-8)
White-Rodgers Co 1209 Cass Ave St Louis 6 Mo (13)
Yellow Springs Instrument Co Inc P O Box 106 Yellow Springs Ohio (13)

10C. TESTERS & LOCATORS

1. Growlers
2. Circuit analyzers
3. Protective device analyzers
4. Magnetos
5. Dynamometers
6. Continuity testers
7. Fluorescent unit testers
8. Insulation testers
9. Turns-ratio testers
10. Polarity testers
11. Cable, metal & outlet locators
12. Cable fault locators
13. Voltage testers
14. Coil testers
15. Bridges
16. Ground resistance testers
17. Stroboscopes
18. Oscilloscopes
19. Relay testers
20. Corona testers
21. Dielectric testers
22. Low-resistance testers
23. Neon testers
24. System analyzers

Airserco Mfg Co Inc 435 Melwood St Pittsburgh 13 Pa (2)
Associated Research Inc 3789 W Belmont Ave Chicago 18 Ill (8-16-20)
Barry Controls Inc 733 Pleasant St Watertown Mass (11)
Berkshire Laboratories 942 Bank Village Greenville NH (17)
●BIDDLE (JAMES G) CO 1316 Arch St Phila 7 Pa (8-9-16-20-21)—ADV PG 108
Bliss Electronic Corp Sussex NJ (19)
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (2)
Borden Engineering Div M J Johnson Aircraft Engineering Co Box 10 Morristown NJ (2-8-11)
Bright Star Industries 600 Getty Ave Clifton NJ (6)
Cincinnati Clock & Instrument Co 1117 Harrison Ave Cincinnati 14 Ohio (3)
Crown Industrial Products Co 713 Amsterdam St Woodstock Ill (5)
Davenport Mfg Co 2532 N Elston Ave Chicago 47 Ill (2-8)
Dice J W) Co Englewood NJ (6-10-22)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (2-23)
Fisher Research Laboratory Inc 1961 University Ave Palo Alto Calif (11)
G-C Electronics Co 400 S Wyman St Rockford Ill (23)
General Electric Co Apparatus Sales Div Schenectady 5 NY (2-3-4-5-8-15)
General Radio Co West Concord Mass (15-17)
Goldak Co Inc 1544 W Glenoaks Blvd Glendale 1 Calif (11)

Gray Instrument Mill Rd Andalusia Pa (15)
Hickok Electrical Instrument Co 10514 Dupont Ave Cleveland 8 Ohio (5-17-18)
Holub Industries Inc 442 Elm St Sycamore Ill (6)
Ideal Industries Inc 5136 Park Ave Sycamore Ill (2-8)
Industrial Development Labs Inc 982 River Rd Edgewater NJ (15)
Instrument Laboratories 315 W Walton Pl Chicago 10 Ill (2)
Jackson Electrical Instrument Co 124 McDonough St Dayton 2 Ohio (2-18)
Kay Electric Co Maple Ave Pine Brook NJ (2)
Leeds & Northrup Co 4970 Stenton Ave Phila 44 Pa (15)
Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (1-2-8-13-14)
Meters Inc 5353 N Keystone Ave Indianapolis 20 Ind (2)
Multi-Amp Div Multi-Amp Electronic Corp 465 Lehigh Ave Union NJ (3-6-8-19-22)
Nankervis (Geo L) Co 15300 Fullerton Ave Detroit 27 Mich (5)
Parr Mfg Corp 48 Hale St Cranford NJ (11)
Peschel Electronics Inc RFD #1 Patterson NY (2)
Plaster-Eye Co 2560 Noblestown Rd Pittsburgh 5 Pa (11-12)
Potter & Rayfield Inc P O Box 1042 Atlanta Ga (1-5)
Principle Research & Development Corp 200 Citizens Bldg Aberdeen SD (12)
Rogers Electric Laboratories Inc 2651 Shaker Rd Cleveland Hts 18 Ohio (11)
Schauer Mfg Corp 4500 Alpine Ave Cincinnati 42 Ohio (1)
Shallcross Mfg Co Preston St Selma NC (11)
Simpson Electric Co 5200 W Kinzie St Chicago 44 Ill (2-8-18)
Sittler Corp 18 N Ada St Chicago 7 Ill (2)
Slaughter Co College & Young Sts Piqua 5 Ohio (8-17)
Snap-On Tools Corp 8028 28th Ave Kenosha Wis (1)
Southwestern Industrial Electronics Co 10201 Westheimer (P O Box 22187) Houston 27 Tex (15)
Speedex Mfg Co 418 S Wyman St Rockford Ill (2)
Standard Electric Time Co 89 Logan St Springfield 2 Mass (5)
Stewart Bros Div Instrument Laboratories 315 W Walton Pl Chicago 10 Ill (2-11)
●STICHT (HERMAN H) CO INC 27 Park Place New York 7 NY (2-6-8-13-15-16-17)—ADV PG 139
Technical Electronics Co 4060 Ince Blvd Culver City Calif (24)
Tektronix Inc P O Box 500 Beaverton Ore (18)
Triplett Electrical Instrument Co 286 Harmon Rd Bluffton Ohio (18)
United States Rubber Co 1230 Avenue of the Americas New York 20 NY (11)
Waterman Products Co Inc 2445-63 Emerald St Phila 25 Pa (18)
Waveland Electric Co 5542 N Ashland Ave Chicago 40 Ill (1)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1-5)
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (2)—ADV PG 2nd COVER
Whitney Blake Co 102 Pursching St New Haven 14 Conn (12)
Yokogawa Electric Works Inc 40 Worth St New York 13 NY (8-16)

10D. BURGLAR ALARM SYSTEMS

1. Residential
2. Commercial & industrial
3. Fence & boundary

American District Telegraph Co 155 Sixth Ave New York 13 NY (1-2-3)
American Sentry Inc 84 Bethlehem Pike Philadelphia 18 Pa (2)
Auth Electric Co Inc 34-20 45th St LIC 1 NY (1)
Bogen-Presto Co Route 4 & Forest Ave (P O Box 500) Paramus NJ (2)
Central Station Signals Inc 53 W 23 St New York 10 NY (1-2-3)
Edwards Co Inc Norwalk Conn (1-2)
Industrial Automation Corp 2415 W Montrose Ave Chicago Ill (1-2)
Kidde Ultrasonic & Detection Alarms Inc 459 Brighton Rd Clifton NJ (1-2-3)
Minneapolis-Honeywell Regulator Co 2753 Fourth Ave S Minneapolis 8 Minn (2-3)
Partlck & Wilkins Co 51 N Seventh St Phila 6 Pa (1-2)
Photobell Co Inc 43 Vesey St New York 7 NY (1-2-3)
Recora Co Inc Powis Rd (Box 68) St Charles Ill (1-2)
Reeve Electrical Co Inc 120 W 42nd St New York 36 NY (2)
Scott (H H) Inc 111 Powder Mill Rd Maynard Mass (2)

10E. FIRE ALARM SYSTEMS

1. Residential
2. Commercial & industrial

Acme Fire Alarm Company Inc 106 Seventh Ave New York 11 NY (2)
American District Telegraph Co 155 Sixth Ave New York 13 NY (2)
American Sentry Inc 84 Bethlehem Pike Philadelphia 18 Pa (2)
Auth Electric Co Inc 34-20 45th St LIC 1 NY (1-2)
Autocall Co 58 Warden Ave Shelby Ohio (2)
Castle Engineering Co P O Box 35 Seneca Castle NY (1-2)
Central Station Signals Inc 53 W 23 St New York 10 NY (2)
Couch (S H) Co Inc 3 Arlington St North Quincy 71 Mass (2)
Edwards Co Inc Norwalk Conn (1-2)
Electronics Corp of America One Memorial Dr Cambridge Mass (2)
Ellenco Inc 3322 M St NW Washington 7 DC (2)
Federal Sign & Signal Corp 13626 S Western Ave Blue Island Ill (2)
Fire Alarm Thermostat Corp 53 W 23 St New York 10 NY (1-2)
Fire Detective Inc 300 Chancellor Ave Newark 12 NJ (1-2)
Gamewell Co Newton Upper Falls 64 Mass (2)
Industrial Automation Corp 2415 W Montrose Ave Chicago Ill (1-2)
International Business Machines Corp Times Equipment Div 590 Madison Ave New York 22 NY (2)
Kidde (Walter) & Co Inc 459 Main St Belleville 9 NJ (1-2)
Kidde Ultrasonic & Detection Alarms Inc 459 Brighton Rd Clifton NJ (1-2)
Minneapolis-Honeywell Regulator Co 2753 Fourth Ave S Minneapolis 8 Minn (2)
National Time & Signal Corp 21800 Wyoming Ave Detroit 37 Mich (2)
Newark District Telegraph Co 372 Plane St Newark 2 NJ (2)
Partrick & Wilkins Co 51 N Seventh St Phila 6 Pa (2)
Reeve Electrical Co Inc 120 W 42nd St New York 36 NY (2)
Russell & Stoll Co Inc 125 Barclay St NY 7 NY (2)
SAFA Alarm Div Inc Fyr-Fyter Co P O Box 1118 Newark NJ (2)
Sperti Faraday Inc 1322 E Church St Adrian Mich (2)
Standard Electric Time Co 89 Logan St Springfield 2 Mass (2)
Stromberg Time Corp 135 S Main St Thomaston Conn (2)
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1-2)—ADV PG 2nd COVER
Wheelock Signals Inc Branchport Ave Long Branch NJ (2)

10F. SIGNAL & COMMUNICATION SYSTEMS

1. Calling, paging & locating systems
2. In-and-out registers
3. Intercom systems and equipment
4. Public address systems
5. Closed circuit TV
6. Master antenna systems & accessories
7. Private telephone systems
8. Two-way radio systems
9. Sound-powered telephones

Adcrafters Co 325 W Huron St Chicago 10 Ill (1-3-4)
American Sentry Inc 84 Bethlehem Pike Philadelphia 18 Pa (1-4)
Auth Electric Co Inc 34-20 45th St LIC 1 NY (1-2-3-7)
Autocall Co 58 Warden Ave Shelby Ohio (1)
Automatic Electric Co Northlake Ill (3-7)
Bell Sound Systems Inc 555 Marion Rd Columbus 7 Ohio (4)
Bliss Electronic Corp Sussex NJ (2-3-4)
Blonder-Tongue Laboratories Inc 9 Alling St Newark 2 NJ (5-6)
Bogen-Presto Co Route 4 & Forest Ave (P O Box 500) Paramus NJ (1-3-4)
Califone Corp 1041 N Sycamore Ave Hollywood 38 Calif (4)
Couch (S H) Co Inc 3 Arlington St North Quincy 71 Mass (1-2-3-8)
Dalmotron Co 534 Laurel St San Carlos Calif (1-3-4-6)
Diamond Power Specialty Corp P O Box 415 Lancaster Ohio (5)
DuKane Corp St Charles Ill (1-3-4-7)
Edwards Co Inc Norwalk Conn (1-2-3)
Executone Inc 415 Lexington Ave New York 17 NY (1-2-3-4-7)
Fanon Electronic Industries Inc 439 Frelinghuysen Ave Newark NJ (3-7-4)
Feiler Engineering & Mfg Co 8026 N Monticello Ave Skokie Ill (3)
Femco Inc Irwin Pa (3-7)
Fisher Berkeley Corp 4224 Holden St Emeryville Calif (1-3)
General Electric Co Industrial Electronics Div Technical Products Dept Electronics Park Syracuse NY (5)
Godfrey Mfg Co 1633 N Halsted St Chicago 16 Ill (5)
●HOSE-McCANN TELEPHONE CO INC 25th St & 3rd Ave Brooklyn 32 NY (3-9)—ADV PG 134
Insul-8-Corp 1369 Industrial Rd San Carlos Calif (5)
International Business Machines Corp Times Equipment Div 590 Madison Ave New York 22 NY (7)
International Tel & Tel Corp Industrial Products Div 15191 Bledsoe St San Fernando Calif (5)
Javyex P O Box 646 Redlands Calif (6)
Jerold Electronics Corp 23rd & Chestnut Sts Phila 3 Pa (1-5-6)
Kin Tel 5725 Kearney Villa Rd San Diego 12 Calif (5)
Kirkland (H R) Co 8 King St Morristown NJ (1-2)
Lake Mfg Co 2323 Chestnut St Oakland Calif (3-6)
Loge (J M) Sound Engineers 2171 W Washington Blvd Los Angeles 18 Calif (1-3-4)
Lovsted (C M) & Co Inc 4000 W Marginal Way Seattle 6 Wash (1)
Mine Safety Appliances Co 201 N Braddock Ave Pittsburgh 8 Pa (3)
Minneapolis-Honeywell Regulator Co 2753 Fourth Ave S Minneapolis 8 Minn (3)
Motorola Communications & Electronics Inc 4501 W Augusta Blvd Chicago 51 Ill (1-8)
Newcomb Audio Products Co 6824 Lexington Ave Hollywood 38 Calif (1-4)
Nutone Inc Madison & Red Bank Roads Cincinnati 27 Ohio (3)
O'Brien Electric Corp 6514 Santa Monica Blvd Hollywood 38 Calif (1-3-4)
Partick & Wilkins Co 51 N Seventh St Phila 6 Pa (1-2)
Perfect-Line Mfg Corp Old Country Rd & Railroad Ave P O Box 65 Hicksville LI NY (3)
Progress Mfg Co Inc Castor Ave & Tulip St Phila 34 Pa (3)
Radio Corp of America Industrial Electronic Products Front & Cooper Sts Camden 2 NJ (1-3-4-5-6-7-8)
Rauland-Borg Corp 3535 West Addison St Chicago 18 Ill (1-3-4)
Rittenhouse Co Inc East St Honeoye Falls NY (3)
Simpson (Mark) Mfg Co Inc 32-28 49th St Long Island City 3 NY (1-3-4)
Sperti Faraday Inc 1322 E Church St Adrian Mich (1-2-5)
Standard Electric Time Co 89 Logan St Springfield 2 Mass (1-2)
Talk-A-Phone Co 5013 N Kedzie Ave Chicago 25 Ill (3)
Trade-Wind Div Robbins & Myers Inc 7755 Paramount Pl Pico Rivera Calif (3)
Webster Electric Co 1900 Clark St Racine Wis (3-4-7)
Wheeler Electronic Corp 150 E Aurora St Waterbury 20 Conn (3-7)
Wheelock Signals Inc Branchport Ave Long Branch NJ (1)

10G. SOUNDING DEVICES

1. Bells
2. Buzzers
3. Gongs
4. Horns
5. Whistles
6. Chimes
7. Sirens

Acme Fire Alarm Company Inc 106 Seventh Ave New York 11 NY (3-6)
Auth Electric Co Inc 34-20 45th St LIC 1 NY (1-2-3-4-6-7)
Autocall Co 58 Warden Ave Shelby Ohio (1-3-4-6-8)
Cable Electric Products Inc 234 Daboll St Providence 7 RI (1-2-6)
Clark-Cooper Co Inc 317 N Market St Palmyra NJ (4-5)
Com-Pak-Ett Mfg Corp 650 Grand St Allegan Mich (2)
Couch (S H) Co Inc 3 Arlington St North Quincy 71 Mass (1-2-3-4)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (1-2)
Edwards Co Inc Norwalk Conn (1-2-3-4-6-7)
Ellenco Inc 3322 M St N W Washington 7 DC (1 through 7)
●FEDERAL SIGN & SIGNAL CORP 13626 S Western Ave Blue Island Ill (1-2-3-4-6-7)—ADV PG 132
Gem Electric Mfg Co Inc 237 37th St Brooklyn NY (1-2)
Hose-McCann Telephone Co Inc 25th St & 3rd Ave Brooklyn 32 NY (1-2-3)
International Business Machines Corp Times Equipment Div 590 Madison Ave New York 22 NY (1-2-3-4-6-7)
International Register Co 2620 W Washington Blvd Chicago 12 Ill (6)
Lake Mfg Co 2323 Chestnut St Oakland Calif (1-2)
Lee Electric Inc 566 52nd St West New York NJ (1-2-3-6)
Liberty Bell Mfg Co Swainsboro Ga (1-2-3-6)
Line Electric Co 229 River St Orange NJ (2)
Lumenite Electronic Corp 407 S Dearborn St Chicago 5 Ill (1-2-4-7)
Marvin Electric Mfg Co 648 Santa Fe Ave Los Angeles 21 Calif (6)
National Time & Signal Corp 21800 Wyoming Ave Detroit 37 Mich (1-2-3-4-6)
Nutone Inc Madison & Red Bank Roads Cincinnati 27 Ohio (6)
Partrick & Wilkins Co 51 N Seventh St Phila 6 Pa (1-2-3-4-6-7)
Portable Light Co Inc 216 William St NY 38 NY (7)
Reeve Electrical Co Inc 120 W 42nd St New York 36 NY (1-2-3)
Rittenhouse Co Inc East St Honeoye Falls NY (1-2-6)
Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa (1-2)

Sireno Co Inc 214 William St New York 38 NY (7)
Spertl Faraday Inc 1322 E Church St Adrian Mich (1-2-4-6-7)
Spies Electric Works 564 W Van Buren St Chicago 7 Ill (1)
Standard Electric Time Co 89 Logan St Springfield 2 Mass (1-2-3-4-6)
Suttle Equipment Co 135 S LaSalle St Chicago 3 Ill (1-2)
Trine Mfg Corp 1430 Ferris Place New York 61 NY (1-2)
Victor Ventilator Div Philip Carey Mfg Co Middletown Ohio (6)
Viking Instruments Inc East Haddam Conn (1-2-3-4-7)
Wheelock Signals Inc Branchport Ave Long Branch NJ (1 thru 6)

TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers* on the Free Information cards elsewhere in this issue.

*Code No.	Description, Pages Catalog No. & Mfr.
10-1	DC Voltmeters; Cat. No. 1-3 (Associated Research)
10-2	Test Sets; Cat. No. 5-1.3 (Associated Research)
10-3	Dielectric Testing Equipment; 15p; Cat. No. 22 (Biddle)
10-4	Frequency Meters; Cat. No. 32-6 (Biddle)
10-5	Ground Testing Instruments; 18p; Cat. No. 25 (Biddle)
10-6	Impulse Fault Locators; 15p; Cat. No. 65 (Biddle)
10-7	Potentiometers; 27p; Cat. No. POT 359 (DeJur-Amsco)
10-8	Polarity Checkers; Cat. No. 107 (Eastern)
10-9	Demand Meters; 8p; Cat. No. GEA-6892 (General Electric)
10-10	High-Voltage Test Sets; 4p; Cat. No. GEA-6839 (General Electric Co)
10-11	Hook-On-Meters; 4p; Cat. No. GEA-6292C (General Electric)
10-12	Watthour Meters; 8p; Cat. No. GEA-6683 (General Electric)
10-13	Mine Safety Devices; 8p; Cat. No. B74 (Joy)
10-14	Electric Indicating Instruments; 30p; Cat. No. 11-57 20M (Marion)
10-15	Annunciator Systems; 51p; Cat. No. 100C (Panalarm)
10-16	Annunciators; 52p; Cat. No. 100C (Panellit)
10-17	Electric Counters; 40p (Post)
10-18	Snap-On Voltmeter; 4p; Cat. No. A603 (Pyramid)
10-19	Laboratory Standards; 27p (Sensitive Research)
10-20	Fire Alarm Systems; 34p; Cat. No. 246 (Standard Electric)

SECTION II. HEATING & COOLING EQUIPMENT

11A. ELECTRIC SPACE HEATERS

1. **Wall panels & units**
2. **Ceiling panels & units**
3. **Ceiling & floor cables**
4. **Baseboard units**
5. **Floor furnaces & heaters**
6. **Duct heaters**
7. **Steam radiators**
8. **Unit heaters, forced air**
9. **Central furnaces**
10. **Portables**
11. **Heated floor mats**
12. **Heater & lighting fixture combined**
13. **Cabinet convectors, heaters & ventilators**
14. **Bathroom heaters**

For space heating of buildings. Industrial and commercial heating equipment is listed under "Electric Process Heating" and "Heating Elements". See also "Heat Pumps."

Acme Electric Heating Corp 99 Reading St Boston 19 Mass (1-4-7-10)
Adam (Frank) Electric Co 3647 Windsor Pl St Louis Mo (1)
Aeroil Products Co Inc 69 Wesley St South Hackensack NJ (8)
Allied Precision Industries 425 Stevens St (P O Box 149) Geneva Ill (1-10)
American-Standard Industrial Div Detroit 32 Mich (1-4-9)
American Tool & Engineering 2105 Moore St San Diego Calif (4)
Ampere Industries 60 Boston St Newark 3 NJ (2-4-10)
●BERKO ELECTRIC MFG CORP 212-40 Jamaica Ave Queens Village 28 NY (1-2-4-10)—ADV PG 148
Berns Air King Corp 3050 N Rockwell St Chicago Ill (1)
Broan Mfg Co Inc Hartford Wis (8-12)
Brown Products Corp 1090 Springfield Rd Union NJ (4)
Can Arm Corp PO Box 156 Champlain NY (1-4-10)
Carrier Corp Carrier Parkway Syracuse 1 NY (8)
Cavalier Corp Electric Heating Div 343 W First St Chattanooga Tenn (1-3-4-10-14)
Ceilheat Inc 5212 Homberg Drive Knoxville Tenn (1-3-4-8-10)
Circle Air Industries Inc 244 Herkimer St Brooklyn 16 NY (1-4-8-10)
Clarage Fan Co Kalamazoo Mich (8)
Continental Radiant Glass Heating Corp 4 W 40 St New York 18 NY (1-2-4-10)
Coolerator Div McGraw-Edison Co 704 Clark St N Albion Mich (4)
Diamond Wire & Cable Co 445 Park Ave Sycamore Ill (3)
Dixie Raydiant Electric Heat Corp 66 Eleventh St N E Atlanta 9 Ga (1-2-3-10)
Easy-Heat Inc 555 N Michigan St Lakeville Ind (3)
Electrend Products Corp State & Water Sts St Joseph Mich (1-8)
Electric Steam Radiator Corp 1 Electric Ave Paris Ky (7)
Electro-Products Mfg Co 8310 N E Highway 99 Vancouver Wash (4)
Electro-Ray Mfg Co 8310 NE Highway 99 Vancouver Wash (4)
Electromode Div Commercial Controls Corp P O Box 1052 Rochester 3 NY (1-3-4-8-10)
Electrovector Inc 475 Flushing Ave Brooklyn 5 NY (1-4)
Emerson Electric Mfg Co 8100 Florissant Ave St Louis 21 Mo (10)
Emerson-Pryne Co Towne Ave at Monterey (P O Box 698) Pomona Calif (2)
Essex Wire Corp Wire & Cable Div 2601 S Adams Marion Ind (3)
Everwarm Inc 3600 Pleasant Ridge Rd Knoxville Tenn (1-3-10)
General Alliance Corp 2105 Moore St San Diego Calif (4)
General Electric Co Apparatus Sales Div Schenectady 5 NY (8-10)
General Electric Co Wiring Devices Dept 95 Hathaway St Providence RI (3-4-8)
Glenn Electric Heater Corp 374 Jeliff Ave Newark NJ (8)
Guyan Machinery Co Inc Box 150 Logan W Va (1-10)
Hanovia Lamp Div Engelhard Industries Inc 100 Chestnut St Newark 5 NJ (2)
Heatmore Inc 651 Driggs Ave Brooklyn 11 NY (1-2-4-10)
Hotpoint Co 5600 W Taylor St Chicago 44 Ill (4)
Hunter Div Robbins & Myers Inc 2500 Frisco Ave Memphis 14 Tenn (1-4-10)
Ilg Electric Ventilating Co 2850 N Pulaski Rd Chicago 41 Ill (8)
Industrial Engineering & Equipment Co Inc 24 Hanley Industrial Ct St Louis 17 Mo (6)
International Oil Burner Co 3800 Park Ave St Louis 10 Mo (4-9)
Interstate Rubber Products Corp 908 Avila St Los Angeles 12 Calif (11)
Kilbury Mfg Co Inc 14529 Hawthorne Blvd Lawndale Calif (8-9)
Knapp-Monarch Co Bent & Potomac St Louis 16 Mo (10)
Kord Mfg Co Inc 4510 White Plains Rd New York 70 NY (10)
Kritzer Products Div Peerless of America 5800 N Pulaski Rd Chicago 46 Ill (9)
Markel Electric Products Inc 145 Seneca St Buffalo 3 NY (1-2-4-8-10)
Matthews Electric Heater Mfg Co Albertville Ala (1-5-10)
Meier Electric and Machine Co Inc 3525 E Washington St Indianapolis 7 Ind (1-3-10)
Mission Appliance Corp Hyde Park Station Los Angeles 43 Calif (1-2)
Modernheat Cable Corp P O Box 754 Kingsport Tenn (1-3-4-10)
Mueller Climatrol Div Worthington Corp 2005 W Oklahoma Ave Milwaukee 1 Wisc (9)
Nutone Inc Madison & Red Bank Roads Cincinnati 27 Ohio (2-8)
Quartz Products Corp 688 Somerset St (P O Box 628) Plainfield NJ (8)
Ramco Mfg & Engineering 5413 NE Columbia Blvd Portland Ore (4-9)
Roberson Inc 1539 E 103 St Seattle 55 Wash (1-3-4-8)
Sair Corp 9802 Euclid Ave Cleveland 6 Ohio (4)
Seaboard Products Corp Electric Heating Div 191 Frelinghuysen Ave Newark NJ (4-10)
Siebring Mfg Co George Iowa (9)
Sun-Tron Corp 7435 W Wilson Ave Chicago 31 Ill (1-2-4)
Sunwarm Inc 1601 Jared Dr (P O Box 266) Kingsport Tenn (1-3-4-10)
Swan Mfg Co 1801 W 26 St Vancouver Wash (1-4)
Thermador Electrical Mfg Co 5119 District Blvd Los Angeles 22 Calif (1-4-8-10)
Thermal-Aire of America Inc 1060 Broad St Newark 2 NJ (1-2-4)
Trade-Wind Div Robbins & Myers Inc 7755 Paramount Pl Pico Rivera Calif (11)
Victor Ventilator Div Philip Carey Mfg Co Middletown Ohio (8)
Vulcan Radiator Co 775 Capitol Ave Hartford 6 Conn (4)
Wessix Electric Heater Co 390 First St San Francisco 5 Calif (1 thru 6-8-10)
Westchester Brickote Products Co Inc 1528 Williamsbridge Rd NY 61 NY (7)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1-4-5-6-8-9-10)
●WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1-4-8-10)—ADV PG 2nd COVER
●WIEGAND (EDWIN L) CO 7637 Thomas Blvd Pittsburgh 8 Pa (1 thru 6-8-10-13)—ADV PG 121
Wing (L J) Mfg Co 303 N Stiles St Linden NJ (8)
York Div Borg-Warner Corp Gantley Rd York Pa (6)
Zell-Aire Corp Orton Ave Reading Pa (1-3-4-8)

11B. HEAT PUMPS

Central, packaged, or custom dual-function units for space heating and cooling of buildings.

Acme Industries Inc 620 N Mechanic St Jackson Mich
American Coils Co Route 524-Lakewood Rd Farmingdale NJ
Carrier Corp Carrier Parkway Syracuse 1 NY
Coolerator Div McGraw-Edison Co 704 Clark St N Albion Mich
Fedders Corp 58-01 Grand Ave Maspeth NY (11B)
Forston Co 2117-2119 Judiway (P O Box 10231) Houston 18 Tex
General Electric Co Air Conditioning Div Weathertron Dept 5 Lawrence St Bloomfield NJ
General Electric Co Appliance & Television Receiver Div Room Air Conditioner Dept Appliance Park Louisville 1 Ky
Mueller Climatrol Div Worthington Corp 2005 W Oklahoma Ave Milwaukee 1 Wisc
Perfection Industries Div Hupp Corp 1135 Ivanhoe Rd Cleveland 10 Ohio
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa
York Div Borg-Warner Corp Grantley Rd York Pa

11C. ELECTRIC PROCESS HEATING EQUIPMENT

1. **Electric ovens**
2. **Electric furnaces**
3. **Electric steam boilers**
4. **Dielectric heaters**
5. **Induction heaters**
6. **Infrared heaters**
7. **Heating elements**
8. **Soil, pipe, & snow-melting cable or tape**
9. **Wire preheaters**
10. **Immersion heaters**
11. **Swimming pool heaters**

Electrical equipment used to provide heat for commercial or industrial processes.

Acme Electric Heating Corp 99 Reading St Boston 19 Mass (1-7)
Acra Electric Corp 9901 Pacific Ave Franklin Park Ill (7)
Ajax Electric Co 954 Frankford Ave Philadelphia 23 Pa (2)

Ajax Magnethermic Corp 3990 Simon Rd Youngstown 1 Ohio (1-2-5)
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (1-4-5)
Bellevue Industrial Furnace Co 2620 Crane Ave Detroit 14 Mich (1-2)
Blue M Electric Co 138th & Chatham Sts Blue Island Ill (1-2)
Can Arm Corp P O Box 156 Champlain NY (6-7)
Coates Electric Mfg Co 3419-11th Ave S W Seattle 4 Wash (1-2-3)
Com-Pak-Ett Mfg Corp 650 Grand St Allegan Mich (10)
Coolerator Div McGraw-Edison Co 704 Clark St N Albion Mich (7)
Corning Glass Works Corning NY (6-7)
Corona Mfg Corp 11300 Tuxford St Sun Valley Calif (1-6-7)
Cuttler-Hammer Inc 228 N 12 St Milwaukee 1 Wisc (4-5-7)
Dalton Electric Heating Co 11 Goodhue St Salem Mass (7)
Despatch Oven Co 619 SE 8th St Minneapolis 14 Minn (1-2-7)
Detroit Electric Furnace Div Kuhlman Electric Co Bay City Mich (2)
Doyle (J E) Co 1220 W 6th St Cleveland 13 Ohio (6)
Dry Clime Lamp Corp Greensburg Ind (1-7)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (7)
Easy-Heat Inc 555 N Michigan St Lakeville Ind (8)
Electric Arc Inc 152 Jelliff Ave Newark 8 NJ (1-2-5)
Electric Hotpack Co Inc Cottman Ave at Melrose St Phila 35 Pa (1-2)
Electromode Div Commercial Controls Corp PO Box 1052 Rochester 3 NY (8)
Everwarm Inc 3600 Pleasant Ridge Rd Knoxville Tenn (7)
Falcon Equipment Co 13th St (Box E-255) New Brighton Pa (1-2-7)
Fostoria Pressed Steel Corp N Main St Fostoria Ohio (1-6)
Fox Products Co 4720 N 18 St Phila 41 Pa (7)
Gem Electro Mfg Co Inc 237 37th St Brooklyn NY (7)
General Electric Co Apparatus Sales Div Schenectady 5 NY (5-7)
Globar Plant (Refractories Div) Carborundum Co Niagara Falls NY (7)
Grieve-Hendry Co Inc 1350 N Elston Ave Chicago 22 Ill (1-2)
Hanovia Lamp Div Engelhard Industries Inc 100 Chestnut St Newark 5 NJ (6)
Harper Electric Furnace Corp 39 River St Buffalo 2 NY (2)
Hayes (C I) Inc 800 Wellington Ave Cranston 10 RI (1-2-5)
Heatube Dept Coolerator Div McGraw-Edison Co Albion Mich (7)
Hevi Duty Electric Co P O Box 563 Milwaukee 1 Wis (1-2-7)
Huppert (K H) Co 68 30 S Cottage Grove Ave Chicago 37 Ill (1-2-7)
Induction Heating Corp 181 Wythe Ave Brooklyn 11 NY (1-4-5)
Industrial Engineering & Equipment Co Inc 24 Hanley Industrial Ct St Louis 17 Mo (7)
Jensen Inc 9331 Freeland Ave Detroit 28 Mich (1)
Kneisley Electric Co 2501-2509 Lagrange St Toledo 3 Ohio (10)
Kord Mfg Co Inc 4510 White Plains Rd New York 70 NY (7)
LaRose (W T) & Associates Inc 31 Ontario St Cohoes NY (4)
Lindberg Engineering Co 2450 W Hubbard St Chicago 12 Ill (1-2)
Lucifer Furnaces Inc Neshaminy Pa (2)
Michigan Oven Co 415 Brainard Detroit 1 Mich (1)
Midget Heater & Specialty Co 2801 Pacific Ave Tacoma 4 Wash (7)
Miskella Infra-Red Co E 73rd & Grand Ave Cleveland 4 Ohio (1-6)
Modernheat Cable Corp P O Box 754 Kingsport Tenn (8)
Nelson Electric Mfg Co P O Box 5385 Tulsa Okla (8)
North American Electric Lamp Co 1520 North 13th St St Louis 6 Mo (1-6)
Pereny Equipment Co 893 Chambers Rd (Station A Box 8153) Columbus Ohio (1-2)
Potter & Rayfield Inc P O Box 1042 Atlanta Ga (1)
Pyrosil Inc 1889 Front St Cuyahoga Falls Ohio (1-6-7)
Reeve Electronics Inc 609 W Lake St Chicago 6 Ill (4-5)
Roberson Inc 1539 E 103 St Seattle 55 Wash (8)
Safeway Heat Elements Inc Middlefield St (P O Box 1109) Middletown Conn (7)
Scientific Electric Inc 105-109 Monroe St Garfield NJ (4-5)
Sherman Industrial Electronics Div of Engineering Design Inc 108 N Gill St State College Pa (1-4-5)
Siebring Mfg Co George Iowa (3-7)
Smith-Gates Corp Farmington Conn (8)
Southeast Lighting Inc 521 E 20 St Charlotte 1 NC (6)
Sta-Warm Electric Co 53 N Chestnut St Ravenna Ohio (2)
Star-A Electric Mfg Co Inc 269 Meserole St Brooklyn 6 NY (7)
Steiner-Ives Co Springfield Rd Union NJ (1)
Sunwarm Inc 1601 Jared Dr (P O Box 266) Kingsport Tenn (8)
Tec Imports 14525 Bessemer St Van Nuys Calif (6)
Thermal-Aire of America Inc 1060 Broad St Newark 2 NJ (6)
Thermal American Fused Quartz Co 18 Salem St Dover NJ (7)
Thermo Electric Mfg Co 513 Huff St Dubuque Iowa (2)
Tocco Div Ohio Crankshaft Co 3800 Harvard Ave Cleveland 5 Ohio (5)
Trent Inc 201-299 Leverington Ave Phila 27 Pa (1-2-7)
Triangle Equipment Co Inc 45 River Rd Nutley 10 NJ (1-6)
Trindl Products Ltd 1807-11 S Clark St Chicago 16 Ill (7)
Trippe Mfg Co 133 N Jefferson St Chicago 6 Ill (6)
Tuttle & Kift Inc 1823 N Monitor St Chicago 39 Ill (7)
Ulanet (George) Co 413-15 Market St Newark 5 NJ (7)
Velotron Inc 1186 Broadway New York 1 NY (1-6)
Vulcan Electric Co 88 Holten St Danvers Mass (7)
Waage Electric Inc 720 Colfax Ave Kenilworth NJ (7)
Walco Electric Co 131 Blackstone St Providence 1 RI (9)
Watlow Electric Mfg Co 1376 Ferguson Ave St Louis 14 Mo (7)
Wesix Electric Heater Co 390 First St San Francisco 5 Calif (6-7-8)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (5-6)
Whitaker (Douglas C) Co Inc 141 E Glenside Ave Glenside Pa (6)
●WIEGAND (EDWIN L) CO 7637 Thomas Blvd Pittsburgh 8 Pa (6-7-11)—ADV PG 121
Wil-Son Mfg Co Cloverport Ky (1-6)
Young Bros Co 1831 Columbus Rd Cleveland 13 Ohio (1-4)

11E. AIR CONDITIONERS

1. Industrial & commercial
2. Residential, central unit
3. Residential, room console
4. Wall, built in
5. Window
6. Portable

Equipment using refrigerating-cycle principle to cool air.

Acme Industries Inc 620 N Mechanic St Jackson Mich (1-2)
Air & Refrigeration Corp 439 Madison Ave New York City NY (1)
Airtemp Div Chrysler Corp 1600 Webster St Dayton 1 Ohio (1-2-4-5)
American Coils Co Route 524-Lakewood Rd Farmingdale NJ (1-2)
American-Standard Industrial Div Detroit 32 Mich (1)
Carrier Corp Carrier Parkway Syracuse 1 NY (1-2-3-4-5-6)
Circle Air Industries Inc 244 Herkimer St Brooklyn 16 NY (1-2-4)
Clarage Fan Co Kalamazoo Mich (1)
Cool-ette Inc 20080 James Couzens Highway Detroit 35 Mich (1-2-4)
Coolerator Div McGraw-Edison Co 704 Clark St N Albion Mich (2-5-6)
Curtis Mfg Co Refrigeration Div 1905 Kienlen Ave St Louis 20 Mo (1-2-3)
Emerson Electric Mfg Co 8100 Florissant Ave St Louis 21 Mo (5)
Fedders Corp 58-01 Grand Ave Maspeth NY (2-4-5)
Forston Co 2117-2119 Judiway (P O Box 10231) Houston 18 Tex (1-2-5)
Frick Co Waynesboro Pa (1)
Frigidaire Div General Motors Corp 300 Taylor St Dayton 1 Ohio (5)
General Electric Co Air Conditioning Div Comm & Indus Air Conditioning Dept 5 Lawrence St Bloomfield NJ (1)
General Electric Co Air Conditioning Div Home Heating & Cooling Dept Troup Highway Tyler Tex (2)
General Electric Co Appliance & Television Receiver Div Room Air Conditioner Dept Appliance Park Louisville 1 Ky (4-5)
Gibson Refrigerator Co 515-615 W Williams St Greenville Mich (1-2-4-5)
Graybar Electric Co Inc 420 Lexington Ave NY 17 NY (1-2-3-5)
Great Northern Mfg Corp 1056 N Wood St Chicago 22 Ill (2)
Hastings Air Conditioning Co Inc 108 S Colorado Ave Hastings Neb (1-2)
Hoyt Mfg Corp Forge Rd Westport Mass (1)
Ilg Electric Ventilating Co 2850 N Pulaski Rd Chicago 41 Ill (1)
International Oil Burner Co 3800 Park Ave St Louis 10 Mo (2)
Kauffman Air Conditioning Co 4336 W Pine Blvd St Louis Mo (1-2-3-4-5)
King Refrigerator Corp 76-02 Woodhaven Blvd Glendale 27 NY (4-5)
Larco Inc Route 20 East Painesville Ohio (1)
Mueller Climatrol Div Worthington Corp 2005 W Oklahoma Ave Milwaukee 1 Wisc (1-2)
Perfection Industries Div Hupp Corp 1135 Ivanhoe Rd Cleveland 10 Ohio (2)
Quiet-Heat Mfg Corp 46 Oliver St Newark 5 NJ (1-2-4-5)
Ready-Power Co 11231 Freud Ave Detroit 14 Mich (1-2)
Remington Corp Remington Air Conditioning Div Willey St Auburn NY (1-2-3-4-5)
Sutton (O A) Corp 1812 W Second Wichita Kans (1-2-4-5)
Trane Co 2nd & Cameron Ave La Crosse Wis (1-2-4)
United States Air Conditioning Corp P O Box 360 Delaware Ohio (1-2)
Welbilt Corp 57-18 Flushing Ave Maspeth 78 LI NY (5)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1 thru 6)
Whirlpool Corp St Joseph Mich (2-4-5)
Worthington Corp Worthington Ave Harrison NJ (1-4)
York Div Borg-Warner Corp Grantley Rd York Pa (1-2-3-4-5)

11F. AIR HANDLING EQUIPMENT

1. Blowers
2. Circulating fans
3. Exhaust fans, industrial & commercial
4. Exhaust fans, residential
5. Portable fans
6. Residential fans & lighting fixtures combined
7. Range hoods
8. Induced draft fans

Equipment used for ventilation, exhaust, or circulation of air. See also "Air Conditioners."

Aerovent Fan Co Inc Ash and Block Sts Piqua Ohio (1-2-3-5)
Air Controls Inc 2310 Superior Ave Cleveland 14 Ohio (2-3-4-5)
Air-Marine Motors Inc 369 Bay View Ave Amityville NY (1)
Airfan Engineering Co 7401 Telegraph Rd Los Angeles 22 Calif (1-3)
Allen Cooler & Ventilator Inc 704 Woodward St Rochester Mich (1-2-3-4)
Alliance Mfg Co Inc Lake Park Blvd Alliance Ohio (5)
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (1)
American Coolair Corp 3604 Mayflower St (P O Box 2300) Jacksonville 3 Fla (2-3-4)
American-Standard Industrial Div Detroit 32 Mich (1-3-4)
Ammerman Co Inc P O Box 182 Stillwater Minn (1-2-3-5)
Arex Co 612 N Michigan Ave Chicago 11 Ill (2-3)
Argo Products Co 3500 Goodfellow St Louis 20 Mo (2-3-4-5)
Atlas Mineral Products Co Mertztown Pa (4)
Atlas Tool and Mfg Co 5147 Natural Bridge Ave St Louis 15 Mo (4-5)
Baldor Electric Co 4353 Duncan Ave St Louis 10 Mo (2-3-4-5)
Bar-Brook Mfg Co Inc 6133-35 Linwood Ave Shreveport La (2-3-4)
Berns Air King Corp 3050 N Rockwell St Chicago Ill (3-4-7)
Bertram (Harvey P) Co 2225 Bogen St Cincinnati Ohio (1-2-3-5)
Broan Mfg Co Inc Hartford Wis (3-4-6-7)
Buffalo Forge Co 490 Broadway Buffalo 5 NY (1-2-3-4)
Burt Mfg Co 936 S High St Akron 11 Ohio (3-4)
Century Fan & Ventilator Co 45 Cedar St Stamford Conn (1-3)
Chelsea Fan and Blower Co 639 South Ave Plainfield NJ (1-2-3-4-5)
Chicago Blower Corp 9867 Pacific Ave Franklin Park Ill (1-2-3)
Circle Air Industries Inc 244 Herkimer St Brooklyn 16 NY (1)
Clarage Fan Co Kalamazoo Mich (1-2-3)
Commercialaire Corp of America 840 E 98 St Brooklyn 36 NY (1 thru 5)
Coppus Engineering Corp 344 Park Ave Worcester 10 Mass (1-5)
Dana Fan & Blower Corp 2644 Colerain Ave Cincinnati 14 Ohio (3-4)
Davidson Fan Co 213 California St Newton 58 Mass (3)
Dayton Electric Mfg Co 126 S Oakley Blvd Chicago 12 Ill (1-2-3-4-5)
DeBothezat Fans Div American Machine & Metals Inc East Moline Ill (2-3-5)
DeVilbiss Co 300 Phillips Ave Toledo 1 Ohio (3)
Diehl Mfg Co 1187 Finderne Ave Somerville NJ (2-3-4)
Dominion Electric Corp 150 Elm St Mansfield Ohio (3-4-5)
Elliott Co Jeannette Pa (1)
Emerson-Pryne Co Towne Ave at Monterey (P O Box 698) Pomona Calif (1-3-4)
Folsom Co Inc 3104 Oak Lane Dallas 26 Tex (2-3-4-5)
Fresh'nd-Aire Div Cory Corp 221 N LaSalle St Chicago Ill (5)
Frigid Inc 128-168 32nd St Brooklyn 32 NY (1-2-3-4-5)
Garden City Fan & Blower Co 801 N Eighth St Niles Mich (1-2-3)

General Blower Co 8610 Ferris Ave Morton Grove Ill (1-2)
Graybar Electric Co Inc 420 Lexington Ave NY 17 NY (1-2-3-4-5)
Hamilton Fan & Blower Co 2644 Colerain Ave Cincinnati 14 Ohio (1-2-3-4)
Hartzell Propeller Fan Co S Englert Ave Piqua Ohio (1-2-3-5)
Heinze Electric Co 685 Lawrence St Lowell Mass (1)
Hirschman-Pohle Co Inc 300 Lent Ave Le Roy NY (3)
Hunter Div Robbins & Myers Inc 2500 Frisco Ave Memphis 14 Tenn (2-3-4-5)
Ilg Electric Ventilating Co 2850 N Pulaski Rd Chicago 41 Ill (1-2-3-4-5)
IMC Magnetics Corp 570 Main St Westbury NY (1)
Industrial Plastic Fabricators Inc Endicott St Norwood Mass (1-3)
International Oil Burner Co 3800 Park Ave St Louis 10 Mo (4)
Iona Ventilator Co Inc 2821-29 W Dauphin St Phila 32 Pa (2-3)
Jeffrey Mfg Co 832 N 4th St Columbus 16 Ohio (1-3)
Joy Mfg Co H W Oliver Bldg Pittsburgh 22 Pa (1-2-3)
Kisco Co Inc 2414 DeKalb St St Louis 4 Mo (5)
Kord Mfg Co Inc 4510 White Plains Rd New York 70 NY (4-5)
Lau Blower Co 2001 Home Ave Dayton 7 Ohio (1 thru 5-7)
Leigh Building Products Coopersville Mich (3)
Lehigh Fan & Blower Div Fuller Co Catasauqua Pa (3-8)
Markel Electric Products Inc 145 Seneca St Buffalo 3 NY (5)
Martin Fan & Blower Co 4634 W 21st Pl Chicago 50 Ill (1-2-3-4-5)
Marvin Electric Mfg Co 648 Santa Fe Ave Los Angeles 21 Calif (4)
McLarty Systems 2600 Dickman Rd Battle Creek Mich (3-5-8)
McLean Engineering Laboratories 70 Washington Rd (P O Box 228) Princeton NJ (2-3-4)
Meier Electric and Machine Co Inc 3525 E Washington St Indianapolis 7 Ind (2-3-4)
National Engineering & Mfg Co 16th & Lamine Sts Sedalia Mo (2-3-4-5)
Norky Mfg Corp P O Box 669 Covington Ky (3-4)
Northern Blower Co 6434 Barberton Ave Cleveland 2 Ohio (3)
Nutone Inc Madison & Red Bank Roads Cincinnati 27 Ohio (4-7)
Peerless Electric Div H K Porter Co Inc 1401 W Market St Warren Ohio (1 thru 4)
Perfect-Line Mfg Corp Old Country Rd & Railroad Ave PO Box 65 Hicksville LI NY (3-4)
Phelps Fan Mfg Co 715 Thomas St Little Rock Ark (2-3-4)
Power Line Fan Co Plainfield NJ (3)
Progress Mfg Co Inc Castor Ave & Tulip St Phila 34 Pa (4-7)
Reed Unit Fans Inc 501 N St Patrick St New Orleans La (2-3-4-5)
Reynolds Electric Co 3000 River Rd River Grove Ill (2-5)
Rich (Phil) Fan Mfg Co Inc 2900 Caroline Houston 4 Texas (2-3-4-5)
Ripley Co Inc Factory St Middletown Conn (1)
Robbins & Myers Inc 1345 Lagonda Ave Springfield Ohio (1-2-3-4)
Roberson Inc 1539 E 103 St Seattle 55 Wash (3)
Roto-Beam 1755-57 N Keeler Ave Chicago 39 Ill (4)
Shallcross Controls Inc 2217-21 N 31 St Milwaukee 8 Wis (1)
Siebring Mfg Co George Iowa (2-3)
Signal Electric Div King-Seeley Corp 1800 13th St Menominee Mich (2-3-4)
Simpson Co 1470 Doolittle Dr San Leandro Calif (4)
Skil Corp 5033 Elston Ave Chicago 30 Ill (1)
Stanat Mfg Co Inc 524 Shames Dr Westbury NY (1)
Standard Electric Mfg Co Inc Haddon Ave West Berlin NJ (2-3-4)
Sterling Blower Co 791 Windsor St Hartford Conn (1-3)
Stewart Industries Inc 320 E St Joseph St Indianapolis 2 Ind (4)
Sutton (O A) Corp 1812 W Second Wichita Kans (2-3-4-5)
Trade-Wind Div Robbins & Meyers Inc 7755 Paramount Pl Pico Rivera Calif (1-3-4)
Trane Co 2nd & Cameron Ave La Crosse Wis (3)
United Blower Co Inc 193 Centre St NY 13 NY (1)
United Electric Motor Co 178 Centre St NY 13 NY (1)
United States Air Conditioning Corp P O Box 360 Delaware Ohio
Valley Fan Mfg Co Box 206 Fort Valley Ga (2-3-4-5)
Ventrola Mfg Co 501 S Chestnut St Owosso Mich (4)
Victor Ventilator Div Philip Carey Mfg Co Middletown Ohio (3-4-7)
Viking Air Products 5601 Walworth Ave Cleveland 2 Ohio (1-4)
West Wind Corp 1800 Airport Way Seattle 4 Wash (1-4-5)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1-2-3-5-6)
Westinghouse Electric Corp Sturtevant Div Damon St Hyde Park Boston 36 Mass (1-3)
Wing (L J) Mfg Co 303 N Stiles St Linden NJ (1-3-8)
Wind-Way Fan & Ventilator Co 531 St Joseph St New Orleans 12 La (2-3-4)

11G. HUMIDIFIERS & DEHUMIDIFIERS

1. Humidifiers
2. Dehumidifiers
3. Air purifiers
4. Air ionizers

For control of air moisture content.

Air & Refrigerator Corp 439 Madison Ave New York City NY
Bahnson Co 1001 S Marshall St Winston-Salem NC
Berns Air King Corp 3050 N Rockwell St Chicago Ill
Carrier Corp Carrier Parkway Syracuse 1 NY
Coolerator Div McGraw-Edison Co 704 Clark St N Albion Mich (11G-3)
Dampp-Chaser Inc 1440 Ridgewood Blvd Hendersonville NC (11G-2)
Dryomatic Corp 806 N Fairfax St Alexandria Va
Ebco Mfg Co 265 N Hamilton Rd Columbus 13 Ohio (1)
Fedders Corp 58-01 Grand Ave Maspeth NY (11-G)
Fresh'nd-Aire Div Cory Corp 221 N La Salle St Chicago Ill (1-2)
Gibson Refrigerator Co 515-615 W Williams St Greenville Mich
Haertel (Walter) Co 2840 4th Ave So Minneapolis Minn
Kauffman Air Conditioning Co 4336 W Pine Blvd St Louis Mo
Mitchell Mfg Co 3200 W Peterson Ave Chicago 45 Ill
Mueller Climatrol Div Worthington Corp 2005 W Oklahoma Ave Milwaukee 1 Wisc
Remington Corp Remington Air Conditioning Div Willey St Auburn NY
Roberson Inc 1539 E 103 St Seattle 55 Wash
Supreme Electric Products Co 194 Vassar St Rochester 7 NY
Suttle Equipment Corp 135 S LaSalle St Chicago 3 Ill
Viking Air Products 5601 Walworth Ave Cleveland 2 Ohio (1)
Walton Laboratories Inc 1186 Grove St Irvington 11 NJ
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1)
Westinghouse Electric Corp Sturtevant Div Damon St Hyde Park Boston 36 Mass
Whirlpool Corp St Joseph Mich
Worthington Corp Worthington Ave Harrison NJ

TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers* on the Free Information cards elsewhere in this issue.

*Code No.	Description, Pages Catalog No. & Mfr.
11-1	Axial Fans; 15p; Cat. No. 3-1-60-10M (Air Marine)
11-2	Centrifugal Blowers; 10p; Cat. No. 8-1-59-10M (Air Marine)
11-3	Air Conditioners; 4p; Cat. No. 8525 (American-Standard)
11-4	Air Conditioners; 8 p; Cat. No. 8525 (American Standard)
11-5	Electric Heaters; Cat. No. GC-106 (Berko)
11-6	Attic Fan Louvers; 8p; Cat. Section D; (Berns)
11-7	Fans; 20p; Cat. Sections E & F (Berns)
11-8	Range Hoods; 8p; Cat. Section E (Berns)
11-9	Electrical Ovens; 40p; Cat. No. M-57 (Blue M)
11-10	Ventilating Equipment; 11p; Cat. No. 592 (Broan)
11-11	Industrial Heaters; 14p; Cat. No. PE-70 (Corning)
11-12	Fans & Blowers; 60p; Cat. No. 9C3-281 (Garden City)
11-13	Electric Unit Heaters; 7p; Cat. No. 809 (Ilg)
11-14	Ventilating & Heating Equipment; 7p; Cat. No. S-318 (Ilg)
11-15	Ventilating Fans; Cat. No. 271-L (Leigh)
11-16	Fan & Hood Combinations; 15p; Cat. No. 30-D-1 (Philip Carey)
11-17	Fans & Blowers; 17p; Cat. No. 230 (Porter)
11-18	Electric Heating Equipment; 20p (Sta-Warm)
11-19	Heating Elements; Cat. No. VG-100 (Vulcan)
11-20	Electric Heaters; Cat. No. F-50100 (Wiegand)
11-21	Electric Heaters; Cat. No. PD106 (Wiegand)

SECTION 12. TOOLS, SUPPLIES & EQUIPMENT

12A. LINEMAN'S TOOLS & ACCESSORIES

1. Climbing equipment
2. Disconnect sticks
3. Hoists, jacks, gins & winches
4. Pike poles and tongs
5. Protective clothing & equipment
6. Tamping, digging & trenching hand tools
7. Tool pouches, buckets & accessory bags
8. Tree trimmers & pruners
9. Wire-string equipment
10. Hot line tools

Heavy mobile pole line equipment is listed under "Line Trucks & Mobile Equipment" in Section 1.

Adams Engineering Co 31711 Solon Rd Solon Ohio (3)
Bartlett Mfg Co 3003 E Grand Blvd Detroit 2 Mich (8)
Bashlin (W M) Co Bashlin Bldg Grove City Pa (1-7)
Bodendieck Tool Co P O Box 499 Taylorville Ill (2-3-4-8)
Buffalo Machine Mfg Co 586 Tonawanda St Buffalo 7 NY (9)
Chance (A B) Co 210 North Allen St Centralia Mo (2-3-4-6-7-8)
Charleston Rubber Co Stark Industrial Park Charleston SC (5)
Chicago Pneumatic Tool Co 6 E 44 St NY 17 NY (3)
Chisholm-Moore Hoist Div Columbus McKinnon Chain Corp 6072 Fremont Ave Tonawanda NY (3)
Coffing Hoist Div Duff-Norton Co Danville Ill (3)
Cope (T J) Div Rome Cable Corp Third & Walnut Sts Collegeville 5 Pa (3)
David's Gloves Inc 21 W Pleasant St Springfield Ohio (5)
Dicke Tool Co 1201 Warren Ave Downers Grove Ill (4-6-8)
Distribution & High Line Specialties Co 2100 Del Norte St Louis 17 Mo (9)
Dorsey (John E) Co 570 E First St Boston 27 Mass (5)
General Scientific Equipment Co Limekiln Pike & Williams Ave Philadelphia 50 Pa (5-7)
Goodall Rubber Co 493 Whitehead Rd Trenton NJ (5)
Handy Angle Div Lug-All Co 355 Lancaster Ave Haverford Pa (3)
Hendrix Wire & Cable Corp Milford NH (12A-9)
Highway Trailer Co 405 E Fulton St Edgerton Wis (3)
Holan Corp 4100 W 150 St Cleveland 35 Ohio (3-6)
Hubbard & Co 6301 Butler St Pittsburgh 1 Pa (6-9)
Hunter Tools 9851 Alburtis St Santa Fe Springs Calif (7)
Hykon Mfg Co 163 E State St (P O Box 923 EP) Alliance Ohio (3)
Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 Ill (3-4-6-8-9)
Kearney (James R) Corp 4236 Clayton Ave St Louis 10 Mo (2-6-8)
King Mfg Corp 3146 N Chicago Ave Chicago 22 Ill (3)

●**KLEIN (MATHIAS) & SONS 7200 McCormick Rd Chicago 45 Ill (1-3-7-9)—ADV PG 135**
Kline Savidge Co Inc 163 N Third St Phila 6 Pa (1-7)
LeTourneau (R G) Inc 2399 S MacArthur Longview Tex (3)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (2-6-9)
Mall Tool Co 25000 S Western Ave Park Forest Ill (6)
McCabe-Powers Body Co 5900 N Broadway St Louis 15 Mo (3)
Miller Equipment Co Inc 13th & New Sts Franklin Pa (1-7)
Miller-Robinson Co 7007 Avalon Blvd Los Angeles 3 Calif (8)
Mine Safety Appliances Co 201 N Braddock Ave Pittsburgh 8 Pa (1-5-7)
Mitchell Industries Inc Box 17 Municipal Airport Mineral Wells Tex (1)
Robot Industries Inc 7041 Orchard St Dearborn Mich (3)
S & C Electric Co 4435 Ravenswood Ave Chicago 40 Ill (2)
Safety Live Line Tool Co 973 86th Ave Oakland 21 Calif (2-3-4-7-9-10)
Sasgen Derrick Co 3101 Grand Ave Chicago Ill (3)
Shaw-Box Crane & Hoist Div Manning Maxwell & Moore Inc Muskegon Mich (3)
Sherman & Reilly Inc 1 Broad St Chattanooga 2 Tenn (3-9)
Silent Hoist & Crane Co 841-63rd St Brooklyn 20 NY (3)
Snyder (M L) & Son Inc 1897 E York St Phila 25 Pa (5)
Southern Electrical Equipment Co 308 West Bland at Mint St Charlotte 3 NC (2)
Surety Rubber Co North High St Carrollton Ohio (5)
Swett (A L) Iron Works 166 Glenwood Ave Median NY (6)
Templeton Kenly & Co Gardner Rd Broadview Ill (3)
Utilities Safety Supply Co Inc Jefferson St at Highway 50 Lee's Summit Mo (1-5-7)
Utilities Service Co 1 Pine St Allentown Pa (3-4)
Watteredge Co 19629 West Lake Rd Rocky River 16 Ohio (9)
Wilson Rubber Co 1200 Garfield Ave SW Canton 6 Ohio (5)
Wiss (J) & Sons Co 33 Littleton Ave Newark 7 NJ (8)

12B. WIRE & CABLE TOOLS & EQUIPMENT

1. Benders, cable & strand
2. Cutting, stripping & splicing tools
3. Wire gages
4. Pulling-in grips, guides, jacks & winches
5. Wire reels, lifts, stands & carts
6. Pressure-connector tools
7. Staplers
8. Twisters
9. Wire measurers
10. Vulcanizing equipment
11. Fish tape, grips, pullers, reels & leaders
12. Wire installation guns

AMP Inc Eisenhower Blvd Harrisburg Pa (2-6)
Adams Engineering Co 31711 Solon Rd Solon Ohio (4-5)
Allen Iron & Steel Co P O Box 550 Norristown Pa (5-9)
Aluminum Co of America 1501 Alcoa Bldg Pittsburgh 19 Pa (6)
American Pulley Co 4200 Wissahickon Ave Phila 29 Pa (5)
Anthony (F M) Co 773 University Ave Berkeley 10 Calif (2-6)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 Ill (11)
Ark-Les Switch Corp 51 Water St Watertown Mass (6)
Arrolet Corp Foot of Bower St Montgomery Pa (11)
Arrow Fastener Co Inc 1 Junius St Brooklyn 12 NY (7)
Artos Engineering Co 2757 S 28 St Milwaukee 46 Wis (2-9)
Barth Corp 12650 Brookpark Rd Cleveland 30 Ohio (4-11)
Bashlin (W M) Co Bashlin Bldg Grove City Pa (4)
Bodendieck Tool Co P O Box 499 Taylorville Ill (2)
Buchanan Electrical Products Corp 434 U S Route 22 Hillside NJ (2-6)
Burbank Electrical Products 215 W Palm Ave P O Box 7 Burbank Calif (2-11)
Burndy Corp Norwalk Conn (3-6)
Cam-Lok Div Empire Products Inc 9201 Blue Ash Rd (Box 98) Cincinnati 36 Ohio (2-6-10)
Columbia Products Inc Wrightsville Pa (5-9)
Cope (T J) Div Rome Cable Corp Third & Walnut Sts Collegeville 5 Pa (1-4-11)
Crescent Tool Co 200 Harrison St Jamestown NY (4)
Davis Electric Co 28 Parker St Wallingford Conn (9)
Dicke Tool Co 1201 Warren Ave Downers Grove Ill (4-5)
Duff-Norton Co P O Box 1889 Pittsburgh 30 Pa (5)
Ericson Mfg Co 5209 Euclid Ave P O Box 1401 Cleveland 3 Ohio (5)
Fargo Mfg Co Inc 845 Main St Poughkeepsie NY (2-4)
France Mfg Co 10325 Berea Rd Cleveland 2 Ohio (2)
Fullman Mfg Co 1209-1215 Jefferson St Latrobe Pa (11)
G-C Electronics Co 400 S Wyman St Rockford Ill (2)
General Hardware Mfg Co Inc 80 White St NY 13 NY (2-3)
Gleason Reel Corp 740 N Plankinton Ave Milwaukee 3 Wis (5)
Graybar Electric Co Inc 420 Lexington Ave NY 17 NY (2-4-6)
Greenlee Tool Co 2136 Twelfth St Rockford Ill (4)
Heller Industrial Fastener Div Heller Roberts Mfg Corp 6115 Carnegie Ave Cleveland 1 Ohio (7)
Highway Trailer Co 405 E Fulton St Edgerton Wis (4)
Holan Corp 4100 W 150 St Cleveland 35 Ohio (4-5)
Holub Industries Inc 442 Elm St Sycamore Ill (2-11)
Hunter Tools 9851 Alburtis St Santa Fe Springs Calif (2)
Husky Products Inc 5300 Vine St Cincinnati 17 Ohio (4)
Hykon Mfg Co 163 E State St (P O Box 923 EP) Alliance Ohio (5-9)
Ideal Industries Inc 5136 Park Ave Sycamore Ill (2-6-11)
Interstate Drop Forge Co Special Products Div 4051 N 27 St Milwaukee 16 Wis (2)
Jerrold Electronics Corp 23rd & Chestnut Sts Phila 3 Pa (2-6)
Jet Line Gun Co 730 Seigle Ave Charlotte NC (12)
Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 Ill (6)
Joy Mfg Co Electrical Products Div 1201 Macklind Ave St Louis 10 Mo (10)
Kearney (James R) Corp 4236 Clayton Ave St Louis 10 Mo (6)
Kellems Co Inc 15 Williams St Stonington Conn (4)
King Mfg Corp 3146 N Chicago Ave Chicago 22 Ill (4)
Klein (Mathias) & Sons 7200 McCormick Rd Chicago 45 Ill (2-4-8-11)
LaRaus Mfg Co Inc LeRoy NY (5)
Lew Electric Fittings Co 627 W Lake St Chicago 6 Ill (11)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (1-4)
●**LINT (CLYDE W) 2323 W 18 St Chicago 8 Ill (9-11)—ADV PG 122**
Madison Equipment Co 5405 Detroit Ave Cleveland 2 Ohio (2-5-9-11)
Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (2)
Marvel Rack Mfg Co Inc 96 43rd Ave NE Minneapolis 21 Minn (9)
Miller Electric Mfg Co Inc 718 S Bounds St Appleton Wisc (13)
Miller Equipment Co Inc 13th & New St Franklin Pa (2)
Milwaukee Parts Corp 607-15 S Sixth St Milwaukee 4 Wis (2)
Mine Safety Appliances Co 201 N Braddock Ave Pittsburgh 8 Pa (2)
Minneapolis Electric & Construction Co 80 S 12 St Minneapolis 3 Minn (9)
Olympic Instruments Inc Vashon Wash (5-9)
Potter & Rayfield Inc P O Box 1042 Atlanta Ga (2)
Rattan Mfg Co 10 Wall St (P O Box 1745) New Haven 7 Conn (11)
Richards (J R) Co P O Box 482 Carnegie Pa (11)
Roll-A-Reel Co 4630 Reading Rd Cincinnati 29 Ohio (5)
Rush Wire Stripper Div Eraser Co Inc 1068 S Clinton St Syracuse 4 NY (2-8)
Sherman (H B) Mfg Co 22 Barney Battle Creek Mich (6)
Snap-on-Tools Corp 8028 28th Ave Kenosha Wis (2)
Speedex Mfg Co 418 S Wyman St Rockford Ill (2)
Steel City Electric Co 1207 Columbus Ave Pittsburgh 33 Pa (11)
Steel Electric Products Co Inc 5602 18th Ave Brooklyn 4 NY (11)
Suttle Equipment Corp 135 S LaSalle St Chicago 3 Ill (5)
Swett (A L) Iron Works 166 Glenwood Ave Medina NY (5)
Templeton Kenly & Co Gardner Rd Broadview Ill (4)
●**THOMAS & BETTS CO 36 Butler St Elizabeth 1 NJ (2-6-11)—ADV PG 119**
Thomas Instrument Co Box 41 Liverpool Rd Phoenix NY (2)
Tomic Sales & Engineering Co 20000 Sherwood Ave Detroit 34 Mich (2)
Triton Mfg Co Inc East Haddam Conn (2)
Utica Drop Forge & Tool Div Kelsey-Hayes Co Utica 4 NY (2)
Vaco Products Co 317 E Ontario St Chicago 11 Ill (6)
Waldman (John J) Co 477 Atlantic Ave Brooklyn 17 NY (9)
Whitaker Real Mfg Co 3704 Jackson St (P O Box 1318) Monroe La (5)
Wiss (J) & Sons Co 33 Littleton Ave Newark 7 NJ (2)
Woodhead (Daniel) Co 15 N Jefferson St Chicago 6 Ill (5)
Yorkville Metal Products Co 677 Broadway NY 12 NY (2)

12C. RACEWAY TOOLS & EQUIPMENT

1. Benders & hickeys, conduit & EMT
2. Cutters & indenters, conduit & EMT
3. Conduit tool pickups & grapples
4. Knockout punches
5. Conduit measurers
6. Pipe pushers
7. Mandrels
8. Reamers
9. Threaders, stocks & dies
10. Pipe vises, stands & holders
11. Conduit racks
12. Bending gauges
13. Bending and pushing pumps
14. Power drives and takeoffs
15. Pipe bevelers

Allen Iron & Steel Co P O Box 550 Norristown Pa (11)
American Pipe Bending Machine Co Inc Poultney Vt (1)
American Pipe Tool Co 4856 W Kinzie St Chicago 44 Ill (8-9-10)
Ampere Industries 60 Boston St Newark 3 NJ (6)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 Ill (1)
Armstrong Bros Tool Co 5200 W Armstrong Ave Chicago 46 Ill (9-10)
Arrolet Corp Foot of Bower St Montgomery Pa (1)
Athol Machine & Foundry Co 82 South St Athol Mass (10)
Beaver Pipe Tools Inc 310 Dana Ave N E Warren Ohio (2-9-14)
Blackhawk Industrial Div Blackhawk Mfg Co 13320 W Reichert Pl Butler Wis (1-4)
●**BRIEGEL METHOD TOOL CO 104 N E First St Galva Ill (2-10)—ADV PG 102**
C & B Engineering and Fabricating Corp P O Box 8701 Houston Tex (1-5)
Chamor Mfg Corp 43-63 11th St Long Island City 1 NY (1)
Collins Machinery Corp 955 Monterey Pass Rd Monterey Park Calif (2-9)
Cope (T J) Div Rome Cable Corp Third & Walnut Sts Collegeville 5 Pa (3)
Erie Tool Works 12th & Liberty Sts Erie Pa (2-9-10)
Gardner Bender Co 5448 N 24 Pl Milwaukee 9 Wis (1)
Gedney Electric Co Americas Bldg Radio City NY 20 NY (1)
General Hardware Mfg Co Inc 80 White St NY 13 NY (8)
Greenlee Tool Co 2136 Twelfth St Rockford Ill (1-4-6-13-14)
Hein-Werner Corp 1200 National Ave Waukesha Wisc (1)
Henderson Electric Co 25 Greenwood Ave East Orange NJ (1)
Hill (Walter P) Inc 22183 Telegraph Rd Detroit 19 Mich (1)
Holub Industries Inc 442 Elm St Sycamore Ill (8)
Hossfeld Mfg Co 460 W Third St Winona Minn (1)
Lew Electric Fittings Co 627 W Lake St Chicago 6 Ill (1)
●**LIDSEEN OF NORTH CAROLINA INC 1000 First St Hayesville NC (1)—ADV PG 114**
●**LINT (CLYDE W) 2323 W 18 St Chicago 8 Ill (1-4-10)—ADV PG 122**
Madison Equipment Co 5405 Detroit Ave Cleveland 2 Ohio (1)
Mercury Hydraulics Inc 1632 Wazee St Denver 2 Colo (6)
Midwest Electric Mfg Co 1639 Walnut St Chicago 12 Ill (1)
Mine Safety Appliances Co 201 N Braddock Ave Pittsburgh 8 Pa (9)
Muncie Gear Works Inc P O Box 433 Cordele Ga (9)
National Electric Div H K Porter Co Inc Porter Bldg Pittsburgh 19 Pa (1)
Nye Tool Co 4120-30 Fullerton Ave Chicago 32 Ill (4-9-10)
Oster Mfg Co 1340 E 289 St Wickliffe Ohio (8-9-10)
Oviatt (D C) Co 2174 Lakeside Ave Cleveland 14 Ohio (2-8-9)
Rattan Mfg Co 10 Wall St (P O Box 1745) New Haven 7 Conn (1)
Republic Steel Corp Steel And Tubes Div 224 E 131 St Cleveland 8 Ohio (1-7)
Richards (J R) Co P O Box 482 Carnegie Pa (1)
Ridge Tool Co 400 Clark St Elyria Ohio (2-8-9-10)
Salem Tool Co 767 S Ellsworth Ave Salem Ohio (6)
●**SILVEY PIPE BENDER CO 2215 Brighton Ave Kansas City 27 Mo (1)—ADV PG 142**
Spring Load Mfg Corp 6332 Maynard Ave Seattle Wash (2)
Steel City Electric Co 1207 Columbus Ave Pittsburgh 33 Pa (1)
Steel Electric Products Co Inc 5602 18th Ave Brooklyn 4 NY (1)
Steelduct Co Republic Steel Bldg Youngstown Ohio (1)
Templeton Kenly & Co Gardner Rd Broadview Ill (6)
Thepitt Mfg Co Gregg & Hammond Sts Carnegie Pa (1)
Thomas & Betts Co 36 Butler St Elizabeth 1 NJ (1)

●TOLEDO PIPE THREADING MACHINE CO 1445 Summit St Toledo 4 Ohio (2-8-9-10)—ADV PG 127

Tulsa Winch Div Vickers Inc 815 E First St Tulsa 20 Okla (14)
Wachs (E H) Co 1525 N Dayton St Chicago 22 Ill (2-15)
Wagner Malleable Products Co 222 W Adams St Chicago 6 Ill (2)
Wells Mfg Co 220 Ninth St San Francisco 3 Calif (2)
Wheeler Mfg Co Ross Rd Ashtabula Ohio (2)

12D. MATERIALS HANDLING EQUIPMENT

1. Ladders
2. Scaffolds, work towers & platforms
3. Hoists
4. Lift trucks
5. Maintenance trucks
6. Hand trucks
7. Truck bodies & bins
8. Bins, cabinets, shelving & framing angle
9. Office & workshop trailers
10. Jacks & jack screws
11. Tool chests
12. Winches

Allen Iron & Steel Co P O Box 550 Norristown Pa (2-6-8)
Allied Mfg & Sales Co 3101 W Grand Ave Chicago 22 Ill (1-2-3-4-5-6)
Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (4)
American Engineering Co Wheatsheaf Lane & Sepviva St Philadelphia 37 Pa (3)
American Pulley Co 4200 Wissahickon Ave Phila 29 Pa (4-5-6-9)
Automatic Transportation Co 101 W 87th St Chicago 20 Ill (4-6)
Baker-Roos Inc 602 W McCarty St Indianapolis 6 Ind (2)
Ballymore Co Lincoln & Garfield Aves West Chester Pa (1-2)
Beaver-Advance Corp 12th & Factory Sts Ellwood City Pa (2)
Bernard-Franklin Co Inc Frankford & Torresdale Aves Philadelphia 24 Pa (6-8)
Bruhn Steel Products Co Dunes Highway (P O Box 567) Chesterton Ind (11)
Building Service Co 4923 18th Ave S Minneapolis 17 Minn (2)
Case (J I) Co Racine Wis (4)
Charles Machine Works Inc P O Box 66 Perry Okla (2)
Chester Hoist Div National Screw & Mfg Co Lisbon Ohio (3)
Chicago Pneumatic Tool Co 6 E 44 St NY 17 NY (3)
Chisholm-Moore Hoist Div Columbus McKinnon Chain Corp 6072 Fremont Ave Tonawanda NY (3)
Clark (George P) Div Cragin & Wilkins Co Inc Fitchburg Mass (4-6)
Coffing Hoist Div Duff-Norton Co Danville Ill (3)
CraneVeyor Corp 1240 S Boyle Ave Los Angeles 23 Calif (3)
Dayton Safety Ladder Co 2337 Gilbert Ave Cincinnati 6 Ohio (1)
Detroit Hoist & Machine Co 8292 Morrow St Detroit 11 Mich (3)
Economy Engineering Co 4511 West Lake St Chicago 24 Ill (1 thru 5)
Ederer Engineering Co 2943 1st Ave S Seattle 4 Wash (3)
Elcor Div F L Jacobs Co 4235 W North Ave Chicago 39 Ill (1-2-5)
Electro Lift Inc 204 Sergeant Ave Clifton NJ (3)
Elwell-Parker Electric Co 4319 St Clair Ave Cleveland 3 Ohio (4)
Erickson Power Lift Trucks Inc St Anthony Blvd & University Ave NE Minneapolis 18 Minn (4)
F W D Corp 105 E 12 St Clintonville Wisc (5)
Fairbanks Co 393 Lafayette St NY 3 NY (6)
Flex Angle Corp 3760 Oakwood Ave (P O Box 418) Youngstown 1 Ohio (8)
Frick-Gallagher Mfg Co 110 S Michigan Ave Wellston Ohio (8)
Goshen Churn & Ladder Inc Goshen Ind (1-2)
Haertel (Walter) Co 2840 4th Ave So Minneapolis Minn (8)
Hamilton Caster & Mfg Co 1519 Dixie Highway Hamilton Ohio (5-6-7-9)
Handy Angle Div Lug-All Co 355 Lancaster Ave Haverford Pa (3)
Harnischfeger Corp 4400 W National Ave Milwaukee 46 Wis (3)
Holan Corp 4100 W 150 St Cleveland 35 Ohio (1-7)
Hyster Co 2902 N E Clackamas St Portland 8 Ore (4)
Ingersoll-Rand Co 11 Broadway NY 4 NY (3)
Inland Ladder Co 1914 Stanford St Alameda Calif (1)
International Trailer Co Inc 725 North Point Rd Baltimore 6 Md (9)
King Mfg Corp 3146 N Chicago Ave Chicago 22 Ill (3)
Lantz Mfg Co Inc Valparaiso Ind (3)
Leebaw Mfg Co 65 Wayne Ave Youngstown 2 Ohio (5-6)
LeTourneau (R G) Inc 2399 S MacArthur Longview Tex (3)
Lift Trucks Inc 2425 Spring Grove Ave Cincinnati 14 Ohio (4-6)
Link-Belt Co Prudential Plaza Chicago 1 Ill (3-4-5-6-8-9)
Lint (Clyde W) 2323 W 18 St Chicago 8 Ill (1)
Manning Maxwell & Moore Inc 250 E Main St Stratford Conn (3)
Massey-Ferguson Industrial Div Massey-Ferguson Inc 1009 S West St Wichita 13N Kans (4)
McCabe-Powers Body Co 5900 N Broadway St Louis 15 Mo (1-3-5-7)
Mercury Mfg Co 4700 W Division St Chicago Ill (4-6)
Moto-Truc Co 1953 E 59 St Cleveland 3 Ohio (4)
Nutting Truck and Caster Co 1201 W Division St Faribault Minn (6)
O'Neil-Irwin Mfg Co 427 Eighth Ave Lake City Minn (6)
Patent Scaffolding Co Inc 38-21 12th St LIC 1 NY (1-2)
Penco Div Alan Wood Steel Co 200 Brower Ave Oaks Pa (8)
Pucel Enterprises Inc 3746 Kelley Ave Cleveland 14 Ohio (6-8)
Reading Crane & Hoist Corp 2100 Adams St Reading Pa (3)
Revolvator Co 2000 86th St North Bergen NJ (12-D)
Robbins & Myers Inc 1345 Lagonda Ave Springfield Ohio (3)
Rol-Away Truck Mfg Co Inc 6143 S E Foster Rd Portland 6 Ore (5)
Round (David) & Son Inc Box 883 Cleveland 22 Ohio (3-12)
Safway Steel Products Inc 6234 W State St Milwaukee 13 Wis (2-3)
Sasgen Derrick Co 3101 Grand Ave Chicago Ill
Scranton Aluminum Mfg Co 419 S Wyoming Ave Scranton Pa (1)
Self-Lifting Piano Truck Co 423 N Main St Findlay Ohio (3-6)
Shaw-Box Crane & Hoist Div Manning Maxwell & Moore Inc Muskegon Mich (3)
Shure Mfg Corp 1601 S Hanley Rd St Louis Mo (8)
Silent Hoist & Crane Co 841-63rd St Brooklyn 20 NY (3-4)
South River Metal Products Co Inc 377 Turnpike South River NJ (1)
Stevens Appliance Truck Co Norton Rd (P O Box 897) Augusta Ga (6)
Swett (A L) Iron Works 166 Glenwood Ave Medina NY (10)
Templeton Kenly & Co Gardner Rd Broadview Ill (10)
Tulsa Winch Div Vickers Inc 815 E First St Tulsa 20 Okla (12)
Up-Right Inc Up-Right Scaffolds Div 1013 Pardee St Berkeley 10 Calif (1-2-3)
Utility Body Co 1530 Wood St Oakland 7 Calif (7)
Waco-Porter Corp 3565 Wooddale Ave Minneapolis 16 Minn (2)
Wellington Machine Co 133 De Wolf St Wellington Ohio (1)
Werner Co (R B) Inc P O Box 580 Greenville Pa (1-2)
Wright Hoist Div American Chain & Cable Co Inc Franklin & Hay Sts York Pa (3)
Yale & Towne Mfg Co 11000 Roosevelt Blvd Philadelphia 15 Pa (3-4-5-6)
Yeats Appliance Dolly Sales Co 2124 N 12th St Milwaukee 5 Wis (6)

12E. ARMATURE & STATOR TOOLS & EQUIPMENT

1. Air gap gauges
2. Dynamic balancers
3. Static balancers
4. Holders & stands
5. Banders
6. Brush seaters
7. Commutator grinding, cutting, scraping & filing equipment
8. Wedge levelers
9. Bushing reamers
10. Brush tension scales

Allen Electric and Equipment Co 2101-2117 N Pitcher St Kalamazoo Mich (7)
Annis (R B) Co 1101 N Delaware St Indianapolis 2 Ind (2)
Associated American Winding Mach Inc 750 St Ann's Ave New York 56 NY (5)
Co-operative Utilities Co Inc 4637-39 Mulberry St Phila 24 Pa (6-7)
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill (4-5-7)
DeWalt Div American Machine & Foundry Co Fountain Ave Lancaster Pa (7)
Foredom Electric Co Inc Bethel Conn (7)
General Electric Co Apparatus Sales Div Schenectady 5 NY (2)
Gisholt Machine Co 1245 E Washington Ave Madison 10 Wis (2)
Heller Tool Co Heller Drive Newcomerstown Ohio (7)
Holub Industries Inc 442 Elm St Sycamore Ill (6-7)
Hullhorst Tools Inc 227 Wamba Ave (P O Box 344) Toledo 7 Ohio (7)
Ideal Industries Inc 5136 Park Ave Sycamore Ill (6-7)
Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (1-6-7-8-9-10)
Micro Balancing Inc 191 Herricks Rd Garden City Pk NY (2)
Potter & Rayfield Inc P O Box 1042 Atlanta Ga (4-5)
Raydyne Corp 2715 S Fourth St (P O Box 1147) Springfield Ill (2)
Simonds Saw and Steel Co 470 Main St Fitchburg Mass (7)
Sittler Corp 18 N Ada St Chicago 7 Ill (6-7)
Snap-on-Tools Corp 8028 28th Ave Kenosha Wis (7)
Vibrascope Co P O Box 97 Glenford NY (2)
Waveland Electric Co 5542 N Ashland Ave Chicago 40 Ill (6-7)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (2)

12F. COIL TOOLS & EQUIPMENT

1. Cheeks
2. Heads
3. Impregnators
4. Lacing hooks
5. Spreaders
6. Tampers
7. Winders & tapers
8. Forms

Armature Coil Equipment Inc 2605 Vega Ave Cleveland 13 Ohio (5-7-8)
Associated American Winding Mach Inc 750 St Ann's Ave New York 56 NY (7)
Chapman (P E) Electrical Works Inc 1820 Chouteau Ave St Louis 3 Mo (7)
Columbia Products Inc Wrightsville Pa (7)
Continental Electric Co 1234 S Prairie Ave (P O Box 895) Hawthorne Calif (2)
Crown Industrial Products Co 713 Amsterdam St Woodstock Ill (6-7)
Dage Television Div Thompson Products Inc Michigan City Ind (5)
Davis Electric Co 28 Parker St Wallingford Conn (7)
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill (2-5-7)
Electro Devices Co Inc 580 Main St Wilmington Mass (7)
Harder (Donald C) Co 3710 Midway Dr San Diego 10 Calif (7)
Leesona Corp P O Box 1605 Providence 1 RI (7)
Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (1-6-7)
Potter & Rayfield Inc P O Box 1042 Atlanta Ga (2-3-7-8)
Stokes (F J) Corp 5500 Tabor Rd Philadelphia 20 Pa (3)
Waldman (John J) Co 477 Atlantic Ave Brooklyn 17 NY (7)
Waveland Electric Co 5542 N Ashland Ave Chicago 40 Ill (1)

12G. INSULATION TOOLS

1. Cutters
2. Edgers, folders, formers & turners
3. Wedge drivers & removers

Billings & Spencer Co 1 Laurel St Hartford 1 Conn (1)
Crown Industrial Products Co 713 Amsterdam St Woodstock Ill (2)
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 Ill (1)
Klein (Mathias) & Sons 7200 McCormick Rd Chicago 45 Ill (1)
Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (1-2-3)
Safety Live Line Tool Co 973 86th Ave Oakland 21 Calif (1)

12H. SOLDERING TOOLS & EQUIPMENT

1. Guns, irons & machines
2. Stands & holders
3. Heaters
4. Pots
5. Torches

Acoustica Associates Inc 26 Windsor Ave Mineola NY (1)
American Electrical Heater Co 6110 Cass Ave Detroit 2 Mich (1-2)
Bernz (Otto) Co Inc Driving Park & Ramona Rochester 13 NY (5)
Chapman (P E) Electrical Works Inc 1820 Chouteau Ave St Louis 3 Mo (1)
Clements Mfg Co 6650 S Narragansett Ave Chicago 38 Ill (5)
Dockson Corp 3839 Wabash Ave Detroit 8 Mich (5)
Eldon Industries Inc Electronic Div 4101 Redwood Ave Los Angeles 66 Calif (1)
Electric Materials Co Box 390 North East Pa (1)
Electric Soldering Iron Co Inc West Elm St Deep River Conn (1-4)
General Electric Co Apparatus Sales Div Schenectady 5 NY (1-4)
Good-All Electric Mfg Co 112 W First St Ogallala Neb (1)
Ideal Industries Inc 5136 Park Ave Sycamore Ill (1)
Insto-Gas Corp 998 E Woodbridge St Detroit 7 Mich (1-3-5)

Hwikheat Mfg Co 3732 San Fernando Rd Glendale 4 Calif (1-2)
Lenk Mfg Co Franklin Ky (1-5)
●LINT (CLYDE W) 2323 W 18 St Chicago 8 Ill (4)—ADV PG 122
Luma Electric Equipment Co 1607 Coining Drive (P O Box 132) Toledo Ohio (1)
Lyon Rural Electric Co 2075 Moore St San Diego 12 Calif (4)
Mine Safety Appliances Co 201 N Braddock Ave Pittsburgh 8 Penna (5)
Mitchell Industries Inc Box 17 Municipal Airport Mineral Wells Tex (1)
National Specialties Co Inc 1902 Howell St Ft Wayne 7 Ind (1)
Prepo Corp Edgerton Wis (5)
Smith Welding Equipment Corp 2633 4th St S E Minneapolis 14 Minn (5)
Snap-on-Tools Corp 8028 28th Ave Kenosha Wis (1)
Sta-Warm Electric Co 53 N Chestnut St Ravenna Ohio (4)
Triton Mfg Co Inc East Haddam Conn (1)
Turner Brass Works 821 Park Ave Sycamore Ill (4-5)
Vulcan Electric Co 88 Holten St Danvers Mass (1-2-3-4)
Waage Electric Inc 720 Colfax Ave Kenilworth NJ (4)
Wall (P) Mfg Co P O Box 71 Grove City Pa (1-2-3)
Weller Electric Corp 601 Stone's Crossing Rd Easton Pa (1)
Wen Products Inc 5808 Northwest Highway Chicago 31 Ill (1)
Wilder Mfg Co Inc Mechanic St & Erie Railroad Port Jervis NY (2)

12J. MISCELLANEOUS SHOP MACHINERY & EQUIPMENT

1. **Arbor presses**
2. **Metal benders**
3. **Metallizers**
4. **Demagnetizers**
5. **Plating equipment**
6. **Etchers & engravers**
7. **Sprayers**
8. **Gear & bearing installers & extractors**
9. **Melting pots, tanks & kettles**
10. **Electric welders & accessories**
11. **Vacuum cleaners & portable blowers**
12. **Lamp disposal units**
13. **Magnetizers**

Acme Electric Heating Corp 99 Reading St Boston 19 Mass (9)
Acro Welder Mfg Co 1719 W St Paul Ave Milwaukee 3 Wis (10)
Acromark Co 320 Morrell St Elizabeth 4 NJ (6)
Aeroil Products Co Inc 69 Wesley St South Hackensack NJ (9)
American Floor Machine Co 518 S St Clair St Toledo 3 Ohio (11)
American Pipe Tool Co 4856 W Kinzie St Chicago 44 Ill (9)
American Vacuum Co 8100 N Ridgeway Skokie Ill (11)
Anderson (Albert & J M) Mfg Co 289 A St Boston 10 Mass (2)
Annis (R B) Co 1101 N Delaware St Indianapolis 2 Ind (4-6-13)
Armstrong-Bray & Co 5366 Northwest Highway Chicago 30 Ill (8)
Auto Arc-Weld Mfg Co 9615 Meech Ave Cleveland 5 Ohio (10)
Birdsell Mfg Co Inc 750 San Antonio Rd Palo Alto Calif (10)
Black & Decker Mfg Co Towson 4 Md (9-11)
Blackhawk Industrial Div Blackhawk Mfg Co 13320 W Reichert Pl Butler Wis (8)
Breuer Electric Mfg Co 5100 N Ravenswood Ave Chicago 40 Ill (11)
Burgess Vibrocafters Grayslake Ill (6)
Caltron Products Co 3518 W Pico Blvd Los Angeles 19 Calif (13)
Chadsey Corp P O Box 1858 Hartford 1 Conn (12)
Clements Mfg Co 6650 S Narragansett Ave Chicago 38 Ill (11)
Cool-Amp Co 8603 W 17 Ave Portland 19 Ore (5)
Cooper (D C) Co 1467 S Michigan Ave Chicago 5 Ill (9)
Cope (T J) Div Rome Cable Corp Third & Walnut Sts Collegeville 5 Pa (9)
Coppus Engineering Corp 344 Park Ave Worcester 10 Mass (11)
Crane-Puller Co Waltham 54 Mass (8)
Crown Industrial Products Co 713 Amsterdam St Wodstock Ill (6)
Crozier Machine Tool Co 684 N Prairie Ave Hawthorne Calif (8)
Dake Corp 724 Robbins Rd Grand Haven Mich (1)
DeVilbiss Co 300 Phillips Ave Toledo 1 Ohio (7)
Dickey-Grabler Co 10302 Madison Ave Cleveland 2 Ohio (6)
Doyle Vacuum Cleaner Co 234 Stevens St S W Grand Rapids Mich (11)
Easco Products Inc P O Box 587 Ypsilanti Mich (4-6-13)
Eisler Engineering Co Inc 750 E 13 St Newark 3 NJ (10)
Electric Arc Inc 152 Jelliff Ave Newark 8 NJ (10)
Electro Engineering Products Co Inc 609 W Lake St Chicago 6 Ill (7)
Erie Tool Works 12th & Liberty Sts Erie Pa (9)
Ewald Instruments Box 124P Kent Conn (10)
Federal Machine & Welder Co 1745 Overland Ave N E Warren Ohio (10)
General Electric Co Apparatus Sales Div Schenectady 5 NY (9)
Graham Mfg Corp 152 Second Ave Needham Hts 94 Mass (10)
Guyan Machinery Co Inc Box 150 Logan W Va (10)
Harnischfeger Corp 4400 W National Ave Milwaukee 46 Wis (10)
Hesse Products Co 3800 N Virginia St Reno Nev (5)
Hobart Bros Hobart Square Troy 1 Ohio (10)
Holub Industries Inc 442 Elm St Sycamore Ill (11)
Hossfeld Mfg Co 460 W Third St Winona Minn (2)
Ideal Industries Inc 5136 Park Ave Sycamore Ill (4-6-11)
Insto-Gas Corp 998 E Woodbridge St Detroit 7 Mich (9)
Invincible Vacuum Cleaner Mfg Co Dover Ohio (11)
Kent Co Inc 359 Canal St Rome NY (11)
Klein (Leo) Electronics 2404 S LaBrea Ave Los Angeles 16 Calif (4-13)
Laduby Co Inc Boston Post Rd (P O Box 88) Branford Conn (12)
Lenco Inc 350 W Adams St Jackson Mo (10)
Lincoln Electric Co 22801 St Clair Ave Cleveland 17 Ohio (10)
Lint (Clyde W) 2323 W 18 St Chicago 8 Ill (2)
Luma Electric Equipment Co 1607 Coining Drive (P O Box 132) Toledo Ohio (4-6)
Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (4-6-8-11)
Mico Instrument Co 80 Trowbridge St Cambridge 38 Mass (6)
Mid-States Welder Mfg Co 6025 S Ashland Ave Chicago 36 Ill (10)
Miller Electric Mfg Co Inc 718 S Bounds St Appleton Wisc (10)
Morrow Co 400 W Madison St Chicago 6 Ill (11)
National Electric Welding Machines Co 1846-1916 N Trumbull St Bay City Mich (10)
National Super Service Co 1946 N 13 St Toledo Ohio (11)
New England Carbide Tool Co Inc 55 Commercial St Medford 55 Mass (2)
Newage Industries Inc 222 York Rd Jenkintown Pa (6)
O'Neil-Irwin Mfg Co 427 Eighth Ave Lake City Minn (2)
Owatonna Tool Co 178 N Cedar St Owatonna Minn (1-8)
Peck Stow & Wilcox Co 274 Center St Southington Conn (2)
Pedrick Tool & Machine Co 3640 N Lawrence St Phila 40 Pa (2)
Peer Inc 1220 Milton St Benton Harbor Mich (10)
Pines Engineering Co Inc 601 Walnut St Aurora Ill (2)
Potter & Rayfield Inc P O Box 1042 Atlanta Ga (2)
Precision Welder Mfg Co 2218 W Lake St Chicago 12 Ill (10)
Pullman Vacuum Cleaner Corp 25 Buick St Boston 15 Mass (11)
Radio Frequency Laboratories Inc Boonton NJ (4-13)
Ramset Fastening System Winchester-Western Div Olin Mathieson Chemical Corp 289 Winchester Ave New Haven 4 Conn (30)
●RAPID ELECTROPLATING PROCESS INC 1414 S Wabash Ave Chicago 5 Ill (5)—ADV PG 128
Rawlplug Co Inc 212 Petersville Rd New Rochelle NY (5)
Raytheon Mfg Co Commercial Apparatus & Systems Div 100 River St Waltham 54 Mass (10)
Rex Welder Co 1200 Milton St Benton Harbor Mich (10)
Sciaky Bros Inc 4915 W 67 St Chicago 38 Ill (10)
Scientific Electric Inc 105-109 Monroe St Garfield NJ (10)
Shrader (F W) Co 11623 S Broadway Los Angeles 61 Calif (4-13)
Snap-on-Tools Crp 8028 28th Ave Kenosha Wis (1-8)
Spencer Turbine Co 486 New Park Ave Hartford 6 Conn (11)
Sta-Warm Electric Co 53 N Chestnut St Ravenna Ohio (9)
Stokes (F J) Corp 5500 Tabor Rd Philadelphia 20 Pa (3)
Swett (A L) Iron Works 166 Glenwood Ave Medina NY (9)
Taylor-Winfield Corp 1052 Mahoning Ave N W Warren Ohio (10)
Trent Inc 201-299 Leverington Ave Phila 27 Pa (9)
Trindl Products Ltd 1807-11 S Clark St Chicago 16 Ill (10)
Truco Masonry Drilling Div Wheel Trueing Tool Co 3200-3220 W Davison Ave Detroit 38 Mich (11)
Turner Brass Works 821 Park Ave Sycamore Ill (9)
Universal Electric Sales Corp 3537 Lee Rd Cleveland 20 Ohio (10)
Versabar Corp 14 Whyte St Jersey City NJ (10)
Vickers Inc Electric Products Div 1847 Locust St St Louis 3 Mo (10)
Vulcan Electric Co 88 Holten St Danvers Mass (9)
Waage Electric Inc 720 Colfax Ave Kenilworth NJ (9)
Walco Electric Co 131 Blackstone St Providence 1 RI (8)
Welduction Corp 19400 W Eight Mile Rd P O Box 146 Southfield Mich (10)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (10-11)

12K. FASTENING DEVICES

1. **Bolt-sealing & screw-anchoring compound**
2. **Expansion bolts, shields & anchors**
3. **Concrete inserts**
4. **Toggle bolts**
5. **Powder-actuated fastening tools**
6. **Hammer-actuated fastening tools**
7. **Equipment seals and sealing devices**
8. **Threaded inserts**

Ackerman-Johnson Co 625 W Jackson Blvd Chicago 6 Ill (2-3-4)
American Sealants Co Hartford 6 Conn (1)
Apex Bolt Products Co 452-458 No Claremont Ave Chicago 12 Ill (2-4)
●ARRO EXPANSION BOLT CO P O Box 388 Marion Ohio (2-4)—ADV PG—104
Automatic & Precision Mfg Co 252 Hawthorne Ave Yonkers 5 NY (7)
Bergen Laboratories Inc 60 Spruce St Paterson 1 NJ (8)
●BLACKHAWK INDUSTRIES 250 S Main St Dubuque Iowa (2)—ADV PG 94
Bulldog Div Gregory Industries Inc Toledo Ave & East 28 St Lorain Ohio (2-4)
Cope (T J) Div Rome Cable Corp Third & Walnut Sts Collegeville 5 Pa (3)
●DIAMOND EXPANSION BOLT CO INC Garwood NJ (2-4)—ADV PG 130
Equipment Corp of America 1537 Superior Ave Cleveland 14 Ohio (2-5)
Fastway Fasteners Inc 1676 E 28 St Lorain Ohio (2-6)
Gateway Engineering Co 3233 W Grand Ave Chicago 51 Ill (3)
Hilti Rapid Fastening Systems Inc 73 Southfield Ave Stamford Conn (2-5)
Holub Industries Inc 442 Elm St Sycamore Ill (2-3-4)
Hubbard & Co 6301 Butler St Pittsburgh 1 Pa (2)
International Seal & Knot Protector Co 58-02 37th Ave Woodside 77 NY (6)
Kirel Inc CPO Box 387 Kingston NY (2)
Leibfried (C H) Mfg Corp 95-101 Guernsey St Brooklyn 22 NY (3)
Mastercraft Plastics Co Inc 95-01 150th St Jamaica 35 NY
Mine Safety Appliances Co 201 N Braddock Ave Pittsburgh 8 Pa (4-5)
Molly Corp 230 N Fifth St Reading Pa (2)
Mult-A-Frame Div Ainsworth Precision Castings Co 1471-77 E Atwater St Detroit 7 Mich (3)
National Lead Co 111 Broadway NY 6 NY (2)
Omark Industries Inc 9701 S E McLoughlin Blvd Portland 22 Ore (5-6)
●PAINE CO Fullerton Ave & Westgate Rd Addison Ill (2-4)—ADV PG 120
Ramset Fastening System Winchester-Western Div Olin Mathieson Chemical Corp 289 Winchester Ave New Haven 4 Conn (4-5)
Rawlplug Co Inc 212 Petersville Rd New Rochelle NY (2-4)
●REMINGTON ARMS CO INC 939 Barnum Ave Bridgeport 2 Conn (5)—ADV PG 133
Security Insert Co 1300 Arch St Phila 7 Pa (3)
Southco Div South Chester Corp Lester Pa (2)
Star Expansion Mountainville NY (2-3-4)
Steel City Electric Co 1207 Columbus Ave Pittsburgh 33 Pa (3)
U S Expansion Bolt Co State St & PRR York Pa (2-4-6)
Wahlund (M Paul) Mechanical Laboratory P O Box 16 Grant Iowa (3)

12L. MISCELLANEOUS ELECTRICIANS' TOOLS

1. **Hammers, pliers, screwdrivers, scizzors, etc.**
2. **Tool pouches & holders**
3. **Fuse pullers**
4. **Lamp changers, incandescent**
5. **Lamp changers, fluorescent**
6. **Test leads & clips**
7. **Contact burnishers**
8. **Wrenches, torque & impact**

Adre Co 8980 W Hawthorne Lane Hales Corners 3 Wis (7)
Aircraft Specialties Inc 415 Howard St Lapeer Mich (1)
Benjamin Div Thomas Industries Inc 207 E Broadway Louisville 2 Ky (4)
Billings & Spencer Co 1 Laurel St Hartford 1 Conn (1)

Black & Decker Mfg Co Towson 4 Md (8)
●BLACKHAWK INDUSTRIES 250 S Main St Dubuque Iowa (1)—ADV PG 94
Bodendieck Tool Co P O Box 499 Taylorville Ill (3)
Bonney Forge & Tool Works 2400 Rockhill Rd (North) Alliance Ohio (1)
Bridgeport Hardware Mfg Corp Scofield Ave Bridgeport 5 Conn (1)
Capewell Mfg Co 60-70 Governor St Hartford 2 Conn (1)
Chadsey Corp P O Box 1858 Hartford 1 Conn (4-5)
●CHAMPION DE ARMENT TOOL CO South Main St Meadville Pa (1)—ADV PG 104-108
Chance (A B) Co 210 North Allen St Centralia Mo (3)
Commercial Enclosed Fuse Co of NJ 6812 Polk St Guttenberg NJ (3)
Crane-Puller Co Waltham 54 Mass (1)
Crescent Tool Co 200 Harrison St Jamestown NY (1)
Dante Electric Mfg Co Bantam Conn (3)
Diamond Tool and Horseshoe Co 4702 Grand Ave Duluth 7 Minn (1)
Dreier Brothers Inc 7301 Woodlawn Ave Chicago 19 Ill (1)
Duro Metal Products Co Kildare & Schubert Sts Chicago Ill (1)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (3)
Eastern Specialty Co 3617 N 8th St Phila 40 Pa (6)
Erie Tool Works 12th & Liberty Sts Erie Pa (1)
Excel Fuse Co 117 W Erie St Pittsburgh 12 Pa (3)
Forsberg Mfg Co 125 Seaview Ave Bridgeport 1 Conn (1)
General Hardware Mfg Co Inc 80 White St NY 13 NY (1)
General Scientific Equipment Co Limekiln Pike & Williams Ave Philadelphia 50 Pa (2)
Graybar Electric Co Inc 420 Lexington Ave NY 17 NY (1)
Greenlee Tool Co 2136 Twelfth St Rockford Ill (1)
Heller Tool Co Heller Drive Newcomerstown Ohio (1)
Holub Industries Inc 442 Elm St Sycamore Ill (3)
Hunter Tools 9851 Alburtis St Santa Fe Springs Calif (1-2)
Ideal Industries Inc 5136 Park Ave Sycamore Ill (3)
Industrial Devices Inc Edgewater 19 NJ (6)
Irwin Auger Bit Co 92 Grant St Wilmington Ohio (1)
Kearney (James R) Corp 4236 Clayton Ave St Louis 10 Mo (3)
Kedman Co 233 S Fifth West St Salt Lake City Utah (1)
Kett Tool Co 5055 Madison Rd Cincinnati 27 Ohio (1)
●KLEIN (MATHIAS) & SONS 7200 McCormick Rd Chicago 45 Ill (1-2)—ADV PG 135
Kraeuter & Co Inc 585 18th Ave Newark 3 NJ (1)
Lint (Clyde W) 2323 W 18 St Chicago 8 Ill (1)
Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (1-3-6)
McGill Mfg Co Inc Valparaiso Ind (4)
Mephisto Tool Co Inc Box 16 Hudson NY (1)
Meteor Mfg Corp Emporium Pa (1)
Miller Equipment Co Inc 13th & New Streets Franklin Pa (1-2)
Millers Falls Co 57 Wells St Greenfield Mass (1)
Milwaukee Electric Tool Corp 5368 W State St Milwaukee 8 Wisc (1)
Mueller Electric Co 1555G E 31 St Cleveland 14 Ohio (6)
Oxwall Tool Co Ltd 928 Broadway New York 10 NY (1)
P & C Tool Co Box 5926 Milwaukie P O Portland 22 Oreg (1)
Pattern Products Co P O Box 135 Union NJ (5)
Price & Rutzebeck P O Box 30 Hayward Calif (1)
Producers and Distributors Inc 1321 Hanover Ave Allentown Pa (1)
Rich (Phil) Fan Mfg Co Inc 2900 Caroline Houston 4 Tex (4-5)
Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa (4)
Seeger-Williams Inc 4 Norman St Bridgeport 5 Conn (3)
Shallcross Controls Inc 2217-21 N 31 St Milwaukee 8 Wis (1)
Simpson Electric Co 5200 W Kinzie St Chicago 44 Ill (6)
Sittler Corp 18 N Ada St Chicago 7 Ill (6)
Skil Corp 5033 Elston Ave Chicago 30 Ill (1)
Slaughter Co College & Young Sts Piqua 5 Ohio (6)
Tec Imports 15001-03 Califa St Van Nuys Calif (2-4)
Thor Power Tool Co 175 N State St Aurora Ill (1-2-9)
Tilden Tool Mfg Co 209 Los Molinos San Clemente Calif (3)
Truco Masonry Drilling Div Wheel Trueing Tool Co 3200-3220 W Davison Ave Detroit 38 Mich (1-2-3)
Union Equipment Sales Corp 1539 Superior Ave Cleveland 14 Ohio (3)
United States Electrical Tool Co 3640 Llewellyn St Cincinnati Ohio (1)
Trico Fuse Mfg Co 2948 No 5th St Milwaukee 12 Wis (3-6)
Utica Drop Forge & Tool Div Kelsey-Hayes Co Utica 4 NY (1)
Vaco Products Co 317 E Ontario St Chicago 11 Ill (1)
Waveland Electric Co 5542 N Ashland Ave Chicago 40 Ill (7)
Wilde Tool Co Inc Hiawatha Kans (1)
Williams (J H) & Co 400 Vulcan St Buffalo 7 NY (1)
Xcelite Inc Thorne Ave at Bank St Orchard Park NY (1)

12M. CUTTING & DRILLING TOOLS

1. Portable electric drills & saws
2. Hand drilling & boring tools
3. Masonry drills
4. Circle cutters
5. Hole saws
6. Metal cutters & shears
7. Star drills
8. Plaster groovers & cutters
9. Hammers, power driven

Albertson & Co Inc 3100 Lowell Sioux City 2 Iowa (1-2)
Arco Mfg Co 1701 13th Ave North (Box 817) Grand Forks ND (1)
Arro Expansion Bolt Co P O Box 388 Marion Ohio (2)
Beverly Shear Mfg Co 3023 W 111 St Chicago 43 Ill (6)
Billings & Spencer Co 1 Laurel St Hartford 1 Conn (6)
Black & Decker Mfg Co Towson 4 Md (1-6-9)
Burgess Vibrocrafters Grayslake Ill (1)
Capewell Mfg Co 60-70 Governor St Hartford 2 Conn (4)
Chicago Pneumatic Tool Co 6 E 44 St NY 17 NY (1)
Cummins Portable Tool Div John Oster Mfg Co 5055 N Lydell Ave Milwaukee 17 Wis (1)
DeWalt Div American Machine & Foundry Co Fountain Ave Lancaster Pa (1-6)
Diamond Expansion Bolt Co Inc Garwood NJ (2)
Easco Products Inc P O Box 587 Ypsilanti Mich (6)
Electric Materials Co Box 390 North East Pa (7)
Electro Engineering Products Co Inc 609 W Lake St Chicago 6 Ill (1)
Equipment Corp of America 1537 Superior Ave Cleveland 14 Ohio (2-3)
Erwood Inc 1770 Berteau Ave Chicago 13 Ill (4)
Gaston Power Tools 999 Ridge Rd Thornton Ill (1)
General Hardware Mfg Co Inc 80 White St New York 13 NY (2-4)
Greenlee Tool Co 2136 Twelfth St Rockford Ill (2)
Haft & Sons Inc 950 Kent Ave Brooklyn 5 NY (3)
Hayden Twist Drill Co Manila Ark (2)
Holub Industries Inc 442 Elm St Sycamore Ill (3-7)
Ingersoll-Rand Co 11 Broadway NY 4 NY (1)
Interstate Drop Forge Co Special Products Div 4051 N 27 St Milwaukee 16 Wis (6)
Irwin Auger Bit Co 92 Grant St Wilmington Ohio (2)
Kawneer Co Niles Mich (4)
Kett Tool Co 5055 Madison Rd Cincinnati 27 Ohio (2)
Lidseen of North Carolina Inc 1000 First St Hayesville NC (6)
●LINT (CLYDE W) 2323 W 18 St Chicago 8 Ill (6)—ADV PG 122
Mall Tool Co 25000 S Western Ave Park Forest Ill (1)
Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (1)
Mephisto Tool Co Inc Box 16 Hudson NY (2)
Mico Instrument Co 80 Trowbridge St Cambridge 38 Mass (4)
Millers Falls Co 57 Wells St Greenfield Mass (1-5)
Milwaukee Electric Tool Corp 5368 W State St Milwaukee 8 Wis (1)
●MISENER MFG CO INC 202-208 Walton St Syracuse 2 NY (4)—ADV PG—140
O'Neil-Irwin Mfg Co 427 Eighth Ave Lake City Minn (6)
●PAINE CO Fullerton Ave & Westgate Rd Addison Ill (2)—ADV PG 120
Peck Stow & Wilcox Co 274 Center St Southington Conn (6)
●PENNSYLVANIA DRILLING CO MASONRY DRILL DIV 1201 Banksville Rd Pittsburgh 16 Pa (2-3)—ADV PG 126
Porter-Cable Machine Co 700 Marcellus St Syracuse 4 NY (1)
Portomag Inc 1521 E Nine Mile Detroit 20 Mich (3)
Price & Rutzebeck P O Box 30 Hayward Calif (1-2-4)
Producers and Distributors Inc 1321 Hanover Ave Allentown Pa (1)
RCS Tool Corp 227 E Front St (P O Box 661) Bloomington Ill (1)
Rawlplug Co Inc 212 Petersville Rd New Rochelle NY (2)
Relton Corp 99 N Lotus Ave (P O Box 5546) Pasadena Calif (3)
Robertson & Ruth 460 W Lake St Elmhurst Ill (6)
Rotary Concrete Drill Co 650 S Arroyo Parkway Pasadena 1 Calif (2)
Shallcross Controls Inc 2217-21 N 31 St Milwaukee 8 Wis (1-2-4)
Skil Corp 5033 Elston Ave Chicago 30 Ill (1-2-4)
Snap-On-Tools Corp 8028 28th Ave Kenosha Wis (1-2-4-6)
Stanley Electric Tools 436 Myrtle St New Britain Conn (1-6)
Star Expansion Mountainville NY (2)
Starrett (L S) Co Athol Mass (4)
Super Tool Co 21650 Hoover Rd Detroit 13 Mich (2)
U S Expansion Bolt Co State St & PRR York Pa (1-2)
Wachs (E H) Co 1525 N Dayton St Chicago 22 Ill (6)
Waveland Electric Co 5542 N Ashland Ave Chicago 40 Ill (3-4-5)
●WELLS MFG CORP 250 Service Rd Three Rivers Mich (6)—ADV PG 144
Wen Products Inc 5808 Northwest Highway Chicago 31 Ill (1)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (3-4-5-7-8)
Whitman & Barnes Div United Drill and Tool Corp 40600 Plymouth Rd Plymouth Mich (2)
Wiss (J) & Sons Co 33 Littleton Ave Newark 7 NJ (6)
Wodack Electric Tool Corp 4627 W Huron St Chicago 44 Ill (1-2-8-9)
Wyzenbeek & Staff Inc 223 N California Ave Chicago 12 Ill (1-4)

12N. MACHINE ACCESSORIES

1. Vibration & shock-isolating mounts
2. Static neutralizers & eliminators
3. Oilers
4. Nameplates, decals & adhesive labels
5. Display turntables

Linemen's protective clothing & equipment is listed under "Linemen's Tools & Accessories" in Section 12.

Acromark Co 320 Morrell St Elizabeth 4 NJ (4)
Atlantic Engravers Inc 52 Ocean Ave Amityville NY (4)
Brady (W H) Co 727 W Glendale Ave Milwaukee 9 Wis (4)
Chicago Decalcomania Co 3310 Elston Ave Chicago 18 Ill (4)
Dickey-Grabler Co 10302 Madison Ave Cleveland 2 Ohio (4)
Doyle (J E) Co 1220 W 6th St Cleveland 13 Ohio (2)
Ericson Mfg Co 1660 Hayden Ave Cleveland 12 Ohio (2)
Eynon-Dakin Co 9900 Freeland Ave Detroit 27 Mich (3)
Industrial Engravers Inc 2212 McDonald Ave Brooklyn 23 NY (4)
Labalon Tape Co Inc 450 Atlantic Ave Rochester 9 NY (4)
National Decalcomania Corp 236-38-40 N 60 St Phila 39 Pa (4)
North Shore Nameplate Div Anodyne Inc 214-27 Northern Blvd Bayside NY (4)
Park Nameplate Co Inc 34-10 Linden Place Flushing NY (4)
Seton Name Plate Co Inc 50 Fitch St New Haven 15 Conn (4)
Spencer Industries 1508 N Mascher St Phila 22 Pa (4)
Stiebt (Herman H) Co Inc 27 Park Pl New York 7 NY (2)
Topflight Corp 160 E-9th Ave York Pa (4)
United States Petroleum Co 104 Lakeview Ave Clifton NJ (3)
United States Radium Corp Hanover Ave Morristown NJ (2-4)
Westline Products Div Western Lithograph Co 600 E Second St Los Angeles 54 Calif (4)

12P. MOTOR & GENERATOR REPLACEMENT PARTS

1. Armatures
2. Bases
3. Bearings & bushings
4. Brushes
5. Brush holders
6. Capacitors, motor-starting & running
7. Commutators, commutator bars & rings
8. Fields & windings
9. Flexible shafts
10. Frames
11. Shims
12. Terminal boxes
13. Slip rings

Ahlberg Bearing Co 3025 W 47 St Chicago 32 Ill (3)
American Pulley Co 4200 Wissahickon Ave Phila 29 Pa (2)
Amplex Div Chrysler Corp P O Box 2718 Detroit 31 Mich (3-7)

Arco Mfg Co 1701 13th Ave North (Box 817) Grand Forks ND (2)
Auburn Mfg Co Pease Ave & Stack St Middletown Conn (11)
Becker Bros Carbon Co 3450 So Laramie Ave Cicero 50 Ill (4)
Boston Gear Works 14 Hayward St Quincy 71 Mass (3)
Boston Woven Hose & Rubber Co P O Box 1071 Boston 3 Mass (18)
Bound Brook Oil-Less Bearing Co Bound Brook NJ (3)
Bronze Bearings Inc 340 N Ave East Cranford NJ (3)
Bunting Brass and Bronze Co 715 Spencer St Toledo 1 Ohio (3)
Carbon Engineering Corp P O Box 256 Slinger Wisc (4)
Carbone Corp 400 Myrtle Ave Boonton NJ (3-4)
Chapin (Chas E) Co Inc 227 Fulton St New York 7 NY (4)
Chicago Commutator Inc Wheeling Rd & Exchange Ct Wheeling Ill (7)
Chicago Die Casting Mfg Co 2510-14 W Monroe St Chicago 12 Ill (3)
Co-operative Utilities Co Inc 4637-39 Mulberry St Phila 24 Pa (5)
Cornell-Dubilier Electric Corp 333 Hamilton Blvd South Plainfield NJ (6)
Dayton Precision Mfg Co 213 N Beckel St Dayton 3 Ohio (7)
Electric Materials Co Box 390 North East Pa (7)
Engelhard Industries Inc 113 Astor St Newark 5 NJ (4)
Flower (D B) Mfg Co 1217 Spring Garden St Philadelphia 23 Pa (5)
Girard-Hopkins 1000 40th Ave Oakland 1 Calif (6)
Green Ball Bearing Co 9518 Cassius Ave Cleveland 5 Ohio (3)
Gwilliam Co 348 Furman St Brooklyn 1 NY (3)
●HELWIG CARBON PRODUCTS INC 2550 N 30 St Milwaukee 10 Wisc (4)—ADV PG 120
Hyatt Bearings Div General Motors Corp Harrison NJ (3)
Illinois Condenser Co 1616 N Throop St Chicago 22 Ill (6)
Industrial Engravers Inc 2212 McDonald Ave Brooklyn 23 NY (11)
Johnson Bronze Co 490 S Mill St New Castle Pa (3)
Keystone Carbon Co Inc 1935 State St St Marys Pa (3-4)
Kirkwood Carbon Corp 4857 W 130 St Cleveland 35 Ohio (4)
Kirkwood Commutator Corp 4855 W 130 St Cleveland 35 Ohio (7-13)
Kolton Electric Mfg Co 123 New Jersey Railroad Ave Newark 5 NJ (12)
Lee (Walter) Chemical Corp 1383 Seabury Ave Bronx 61 NY (11)
Mall Tool Co 25000 S Western Ave Park Forest Ill (9)
Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (9)
Murray Equipment Co Inc 14011 Oakland Ave Detroit 3 Mich (2)
National Electric Coil Div McGraw-Edison Co 800 King Ave Columbus 16 Ohio (8)
Ohio Carbon Co 12508 Berea Rd Cleveland 11 Ohio (4)
Overly-Hautz Co 11500 Madison Ave Cleveland 2 Ohio (2)
Pure Carbon Co Inc 441 Hall Ave St Marys Pa (4)
Pyramid Electric Co 1445 Hudson Blvd North Bergen NJ (6)
Randall Graphite Bearings Inc Greenlawn & Lake Sts Lima Ohio (3)
Ringsdorff Carbon Corp Box 22 East McKeesport Pa (4-5)
Russell & Stoll Co Inc 125 Barclay St NY 7 NY (1)
SKF Industries Inc Front St & Erie Ave Phila 32 Pa (3)
St. Marys Carbon Co State St St Marys Pa (3-4)
Seager Standard Carbon Co 291 Church St New York 13 NY (4)
Shenango Furnace Co Centrifugally Cast Products Div West Third St Dover Ohio (3-13)
Southern Carbon Brush Co Inc 7 18th St SW (P O Box 1710) Birmingham 1 Ala (4)
Southern Electrical Equipment Co 308 W Bland at Mint St Charlotte 3 NC (13)
Sprague Electric Co North Adams Mass (6)
Stackpole Carbon Co Stackpole St St Marys Pa (3-4)
Stow Mfg Co 162 Shear St Binghamton NY (9)
Superior Carbon Products Co 9115 George Ave Cleveland 5 Ohio (4-13)
Swiss Jewel Co 225 Lafayette Bldg Phila 6 Pa (3)
Toledo Commutator Co 1101 S Chestnut St Owosso Mich (7-13)
Torrington Co 59 Field St Torrington Conn (3)
United States Graphite Co 1621 Holland Ave Saginaw Mich (3-4)
Waveland Electric Co 5542 N Ashland Ave Chicago 40 Ill (4-5)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1 thru 13)
Wilmington Fibre Specialty Co New Castle Dela (11)
Wrought Washer Mfg Co 2280 S Bay St Milwaukee 7 Wis (3-11)

12Q. SHEETS, RODS & TUBES

1. **Asbestos**
2. **Cambric**
3. **Fiber, glass fiber & fiberboard**
4. **Paper composition**
5. **Mica**
6. **Polyester film**
7. **Pressboard (Fullerboard)**
8. **Plastic**
9. **Silicone**
10. **Varnished silk**

Allegheny Plastics Inc Rt 51 & Thorn Run Rd Coraopolis Pa (8)
Anchor Packing Co 401 N Broad St Philadelphia 8 Pa (1)
Auburn Mfg Co Pease Ave & Stack St Middletown Conn (1 thru 9)
Bios Laboratories Inc 17 W 60 St New York 23 NY (5-6-8-9)
Brand Dielectrics 57 North St Willimantic Conn (1 thru 4)
Chase & Sons Inc 26 Spruce St North Quincy Mass (6-8-9)
Connecticut Hard Rubber Co 407 East St New Haven 9 Conn (9)
Continental-Diamond Fibre Newark Del (1-3-4)
Cottrell Paper Co Inc 10 Purchase St Fall River Mass (6)
Electro-Technical Products Div Sun Chemical Corp 113 E Centre St Nutley 10 NJ (1-2-3-4-6-9-10)
Emerson Plastics Corp 1383 Seabury Ave Bronx 61 NY (3-4-5-7-8-9)
General Electric Co Chemical & Metallurgical Div Silicone Products Dept Waterford NY (9)
General Electric Co Insulating Materials Sec Chemical Materials Dept 24 River Rd Schenectady 5 NY (2-4)
Glastic Corp 4321 Glenridge Rd Cleveland 21 Ohio (8)
Illumitronic Engineering 680 E Taylor Ave Sunnyvale Calif (8)
Insulation Mfrs Corp 565 W Washington Blvd Chicago 6 Ill (4)
●JOHNS-MANVILLE 22 E 40 St New York 16 NY (1-3)—ADV PG 130
Keasbey & Mattison Co Butler Ave Ambler Pa (1)
Lee (Walter) Chemical Corp 1383 Seabury Ave Bronx 61 NY (8)
Markel (L Frank) & Sons Norristown Pa (3)
Mica Fabricating Co 53 Central Ave Rochelle Park NJ (4-5)
Micacraft Products Inc 701-03 McCarter Highway Newark 5 NJ (5)
Minnesota Mining & Mfg Co Irvington Div 6 Argyle Terrace Irvington 11 NJ (1 thru 6-8-9-10)
Mitchell Rand Insulation Co 51 Murray St NY 7 NY (1-2-4)
Mycalex Corp of America 125 Clifton Blvd Clifton NJ (5)
National Electric Coil Div McGraw-Edison Co 800 King Ave Columbus 16 Ohio (1-2-3-4-5-6-7-8-9)
Natvar Corp 211 Randolph Ave Woodbridge NJ (2-4-8-10)
Panelyte Div St Regis Paper Co Enterprise Ave Trenton NJ (8)
Penn Fibre & Specialty Co Inc 2024 E Westmoreland St Phila 34 Pa (3-4-7-8)
Permacel US Highway 1 New Brunswick NJ (1-4)
Polyken Sales Div Kendall Co 309 W Jackson Blvd Chicago 6 Ill (8)
Polymer Corp 2120 Fairmont Ave Reading Pa (8)
Raybestos-Manhattan Inc 61 Willett St Passaic NJ (1)
Red Seal Electric Co 10307 Detroit Ave Cleveland 2 Ohio (3-8)
Ruberoid Co 500 Fifth Ave New York 36 NY (1)
Silicone Insulation Inc 1383 Seabury Ave Bronx 61 NY (3-8-9)
Spaulding Fibre Co Inc 310 Wheeler St Tonawanda NY (3-4-7-8)
Stone Paper Tube Co 900 Franklin St NE Washington 17 DC (4)
Sylvania Electric Products Inc 1740 Broadway NY 19 NY (5)
Taylor Fibre Co Norristown Pa (3-8-9)
Union Carbide Corp Silicones Div 30 E 42 St New York 17 NY (9)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1-3-4-5-8)
Wilmington Fibre Specialty Co New Castle Dela (3-4-8)

12R. TAPE—PRESSURE-SENSITIVE (ADHESIVE)

1. **Cellophane**
2. **Electrical**
3. **Friction**
4. **Masking**
5. **Rubber**
6. **Varnished cambric**
7. **Plastic**

●ACCURATE MFG CO 44 Hepworth Place Garfield NJ (2-3-5-7)—ADV PG 104
Anchor Packing Co 401 N Broad St Philadelphia 8 Pa (2-3)
Appleton Rubber Co Inc 57 Cornwall St Boston 30 Mass (3-5-7)
●BISHOP MFG CORP 10 Canfield Rd Cedar Gove NJ (2-5-7)—ADV PG 112
●BOSTON WOVEN HOSE & RUBBER CO P O Box 1071 Boston 3 Mass (2-3-5-7)—ADV PG 91
Brand Dielectrics 57 North St Willimantic Conn (2)
Bright Star Industries 600 Getty Ave Clifton NJ (2-3-5-7)
Chase & Sons Inc 26 Spruce St North Quincy Mass (1-2-3-5-7)
Clifton Mfg Co Inc Mattapan Boston 26 Mass (2-3-5-7)
Connecticut Hard Rubber Co 407 East St New Haven 9 Conn (2)
Continental-Diamond Fibre Newark Del (2-7)
Dayton Industrial Products Co Melrose Park Ill (2-3-5-7)
Dunton (M W) Co 350 Kinsley Ave Providence RI (2-3)
Dutch Brand Div Johns-Manville 7800 S Woodlawn Ave Chicago 19 Ill (2-3-4-5-7)
Electro-Technical Products Div Sun Chemical Corp 113 E Centre St Nutley 10 NJ (1-6-7)
General Electric Co Insulating Materials Sec Chemical Materials Dept 24 River Rd Schenectady 5 NY (6-7)
Goodall Rubber Co 493 Whitehead Rd Trenton NJ (3-5-7)
●GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (2-3-4-5)—ADV PG 2
Haartz-Mason Inc 270 Pleasant St Watertown 72 Mass (2-3-5-7)
Insulation Mfrs Corp 565 W Washington Blvd Chicago 6 Ill (3)
Jenkins Bros Rubber Div 100 Park Ave New York 17 NY (3-5-7)
●JOHNS-MANVILLE 22 E 40 St New York 16 NY (1 thru 7)—ADV PG 130
Lee (Walter) Chemical Corp 1383 Seabury Ave Bronx 61 NY (7)
Linton (Horace) Div Hess Goldsmith & Co Inc 1400 Broadway New York 18 NY (2)
Mica Fabricating Co 53 Central Ave Rochelle Park NJ (2)
Minnesota Mining and Mfg Co Electrical Products Div 900 Bush Ave St Paul 6 Minn (2-5-7)
Minnesota Mining & Mfg Co Irvington Div 6 Argyle Terrace Irvington 11 NJ (1-2-5-6-7)
Mitchell Rand Insulation Co 51 Murray St NY 7 NY (1 thru 7)
Mystik Adhesive Products Inc 2635 N Kildare Ave Chicago 39 Ill (2-4-5)
National Electric Coil Div McGraw-Edison Co 800 King Avenue Columbus 16 Ohio (2-6)
Permacel US Highway 1 New Brunswick NJ (1-2-4-7)
Peters Mfg Co 162 Old Colony Ave Wollaston 70 Mass (2-5)
Plymouth Rubber Co Inc 23 Revere St Canton Mass (2-3-4-5-7)
Polyken Sales Div Kendall Co 309 W Jackson Blvd Chicago 6 Ill (4-7)
Polymer Corp 2120 Fairmont Ave Reading Pa (2-7)
Raybestos-Manhattan Inc 61 Willett St Passaic NJ (5-7)
Ruberoid Co 500 Fifth Ave New York 36 NY (3)
Sunerior Insulatinn Tane Co 3100 Lambdin Ave St Louis 15 Mo (3-5-7)
Tooflight Corp 160 E 9th Ave York Pa (1-2)
United States Rubber Co 1230 Avenue of the Americas New York 20 NY (2-3-4-5-6-7)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (2-6)

12S. TAPE—WOVEN & OTHER

1. **Asbestos**
2. **Cellulose acetate**
3. **Cotton**
4. **Crepe paper**
5. **Polyester**
6. **Polyethelene**
7. **Glass fiber**
8. **Silicone**

Anchor Packing Co 401 N Broad St Philadelphia 8 Pa (1)
Atlas Asbestos Co 423 Walnut St North Wales Pa (1-7)
Auburn Mfg Co Pease Ave & Stack St Middletown Conn (1-6-8)
●BISHOP MFG CORP 10 Canfield Rd Cedar Gove NJ (6)—ADV PG 112
Brand Dielectrics 57 North St Willimantic Conn (7-8)
Chase & Sons Inc 26 Spruce St North Quincy Mass (1-2-3-6-7-8)
Clifton Mfg Co Inc 34 Topalian St Mattapan Boston 26 Mass (7-8)
Connecticut Hard Rubber Co 407 East St New Haven 9 Conn (8)
Continental-Diamond Fibre Newark Del (1-5-7-8)
Dutch Brand Div Johns-Manville 7800 S Woodlawn Ave Chicago 19 Ill (3-4-5-7)
Electro-Technical Products Div Sun Chemical Corp 112 E Centre St Nutley 10 NK (1-5-8)
General Electric Co Insulating Materials Sec Chemical Materials Dept 24 River Rd Schenectady 5 NY (6-8)
Insulation Mfrs Corp 565 W Washington Blvd Chicago 6 Ill (1-3)
●JOHNS-MANVILLE 22 E 40 St New York 16 NY (1)—ADV PG 130
Keasbey & Mattison Co Butler Ave Ambler Pa (1)
Minnesota Mining & Mfg Co Irvington Div 6 Argyle Terrace Ivington 11 NJ (1 thru 8)
Mitchell Rand Insulation Co 51 Murray St NY 7 NY (1 thru 4)
National Electric Coil Div McGraw-Edison Co 800 King Avenue Columbus 16 Ohio (7-8)
Natvar Corp 211 Randolph Ave Woodbridge NJ (7-8)

Permacel US Highway 1 New Brunswick NJ (2-3-4-5-6-8-8)
Peters Mfg Co 162 Old Colony Ave Wollaston 70 Mass (4-5-8)
Plymouth Rubber Co Inc 23 Revere St Canton Mass (6)
Polyken Sales Div Kendall Co 309 W Jackson Blvd Chicago 6 Ill (6-7-8)
Raybestos-Manhattan Inc 61 Willett St Passaic NJ (1)
United States Rubber Co 1230 Avenue of the Americas New York 20 NY (1)
Varflex Corp 508 W Court St Rome NY (5-6-7)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (1-3-7-8)

12T. FLEXIBLE SLEEVING & TUBING

1. Cotton
2. Silicone
3. Plastic
4. Rubber
5. Fiber
6. Asbestos

Allegheny Plastics Inc Rt 51 & Thorn Run Rd Coraopolis Pa (3)
Alpha Wire Corp 200 Varick St New York 14 NY (2-3-4-5)
Atlas Asbestos Co 423 Walnut St North Wales Pa (6)
Automatic Vulcanizers Corp 16 Hudson St New York 13 NY (4)
Brand (William)-Rex Div American Enka Corp 31 Sudbury Rd Concord Mass (1-2-3)
Connecticut Hard Rubber Co 407 East St New Haven 9 Conn (4)
Continental-Diamond Fibre Newak Del (2-3-5)
Goodall Rubber Co 493 Whitehead Rd Trenton NJ (3-4)
Hewitt-Robins Inc 666 Glenbrook Rd Stamford Conn (1-4)
Hitemp Wires Inc 1200 Shames Dr Westbury NY (3)
Illumitronic Engineering 680 E Taylor Ave Sunnyvale Calif (3)
Insulation Mfrs Corp 565 W Washington Blvd Chicago 6 Ill (1-2)
●JOHNS-MANVILLE 22 E 40 St New York 16 NY (6)—ADV PG 130
Keasbey & Mattison Co Butler Ave Ambler Pa (6)
Kirel Inc Box 459A RFD 1 Kingston NY (2)
Lee (Walter) Chemical Corp 1383 Seabury Ave Bronx 61 NY (3)
Minnesota Mining & Mfg Co Irvington Div 6 Argyle Terrace Irvington 11 NJ (1 thru 5)
Mitchell Rand Insulation Co 51 Murray St NY 7 NY (1-2-5)
National Electric Coil Div McGraw-Edison Co 800 King Avenue Columbus 16 Ohio (1-2)
Natvar Corp 211 Randolph Ave Woodbridge NJ (2-3)
Permacel US Highway 1 New Brunswick NJ (3)
Polymer Corp 2120 Fairmont Ave Reading Pa (3)
Saylor Electric Products Corp 277 Pierce St Birmingham Mich (1-3-5)
Snyder (M L) & Son Inc 1897 E York St Phila 25 Pa (3-4)
Stone Paper Tube Co 900 Franklin St NE Washington 17 DC (3-5)
Suflex Corp 33-40 57th St Woodside 77 NY (1-2-3-4)
United States Rubber Co 1230 Avenue of the Americas New York 20 NY (3-4)
Varflex Corp 508 W Court St Rome NY (1 thru 5)
Westline Products Div Western Lithograph Co 600 E Second St Los Angeles 54 Calif (3)
Wilmington Fibre Specialty Co New Castle Dela (5)

12U. INSULATING MATERIALS—MISCELLANEOUS

1. Beads
2. Cable wrapping
3. Cement
4. Fused quartz
5. Insulating compounds
6. Varnished canvas (duck cloth)
7. Insulating paint
8. Porcelain insulating products
9. Slate
10. Switchboard mats
11. Varnish
12. Asbestos, ebony & soapstone
13. Insulating paper & cloth

American Products Mfg Co Inc 8127-33 Oleander St New Orleans 18 La (5)
Arles Laboratories Inc 45-33 Davis St Long Island City 1 NY (5)
All-State Welding Alloys Co Inc 249-55 Ferris Ave White Plains NY (5)
Atlas Asbestos Co 423 Walnut St North Wales Pa (3)
Automatic Vulcanizers Corp 16 Hudson St New York 13 NY (5)
Barrett Varnish Co 1532 S 50th St Cicero 50 Ill (3-7-11)
Bios Laboratories Inc 17 W 60 St New York 23 NY (3-5-7-11)
Blackburn (Jasper) Corp 1525 Woodson Rd St Louis 14 Mo (5)
Borthig (George C) Co Inc P O Box 115 East Rutherford NJ (3-5-7-11)
Brand Dielectrics 57 North St Willimantic Conn (2-6)
Central Scientific Co 1700 Irving Pk Rd Chicago 13 Ill (3)
Connecticut Hard Rubber Co 407 East St New Haven 9 Conn (3)
Cook's Sons (Adam) Inc 5 N Stiles St Linden NJ (5)
Cottrell Paper Co Inc 10 Purchase St Fall River Mass (12)
Delta Chemical Works Inc 23 W 60 St New York 23 NY (3-5-7-11)
Dolph (John C) Co Monmouth Junction NJ (5-11)
Dow Corning Corp Midland Mich (5-11)
Eagle-Picher Co American Building Cincinnati 1 Ohio (3-5)
Electro-Technical Products Div Sun Chemical Corp 113 E Centre St Nutley 10 NJ (6)
Engelhard Industries Inc 113 Astor St Newark 5 NJ (4)
Fargo Mfg Co Inc 845 Main St Poughkeepsie NY (5)
G & W Electric Specialty Co 3500 W 127 St Blue Island Ill (5)
General Electric Co Chemical & Metallurgical Div Silicone Products Dept Waterford NY (5-11)
General Electric Co Insulating Materials Sec Chemical Materials Dept 24 River Rd Schenectady 5 NY (3-5-6-7-11)
Goodrich (B F) Chemical Co 3135 Euclid Ave Cleveland 15 Ohio (5)
Hardman (H V) Co Inc 571 Cortlandt St Belleville 9 NJ (5)
Hubbard & Co 6301 Butler St Pittsburgh 1 Pa (8)
I-T-E Circuit Breaker Co 1900 Hamilton St Philadelphia 30 Pa (8)
I-T-E Circuit Breaker Co Victor Insulators Div Victor NY (8)
Illinois Edison Porcelain McGraw-Edison Co 510 N Pearl St Macomb Ill (8)
Illumitronic Engineering 680 East Taylor Ave Sunnyvale Calif (2)
Induction Heating Corp 181 Wythe Ave Brooklyn 11 NY (5)
Isolantite Mfg Corp Stirling NJ (1-12)
●JOHNS-MANVILLE 22 E 40 St New York 16 NY (3-5-12)—ADV PG 130
Joy Mfg Co Electrical Products Div 1201 Macklind Ave St Louis 10 Mo (5)
Keasbey & Mattison Co Butler Ave Ambler Pa (12)
Lapp Insulator Co Inc 35 Gilbert St Leroy NY (8)
Lastik Paint Inc 201 Iroquois Bldg Pittsburgh 13 Pa (11)
Lint (Clyde W) 2323 W 18 St Chicago 8 Ill (8)
Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (1-3)
Midland Industrial Div Harrison Paint & Varnish Co 1329 Harrison Ave SW Canton 1 Ohio (7)
Minerallac Electric Co 25 N Peoria St Chicago 7 Ill (5)
Minnesota Mining and Mfg Co Electrical Products Div 900 Bush Ave St Paul 6 Minn (5)
Minnesota Mining & Mfg Co Irvington Div 6 Argyle Terrace Irvington 11 NJ (2-3-5-6-7-11)
Mitchell Rand Insulation Co 51 Murray St NY 7 NY (5-6-7-11)
National Electric Coil Div McGraw-Edison Co 800 King Ave Columbus 16 Ohio (6)
Natvar Corp 211 Randolph Ave Woodbridge NJ (6)
New Jersey Porcelain Co Inc Plum St & NY Ave (P O Box 908) Trenton 5 NJ (8)
PLM Products Inc 3871 W 150 St Cleveland 11 Ohio (5)
Permacel US Highway 1 New Brunswick NJ (5-11)
Peters Mfg Co 162 Old Colony Ave Woolaston 70 Mass (5)
Plymouth Rubber Co Inc 23 Revere St Canton Mass (5)
Porcelain Products Co 224 N Patterson St Carey Ohio (8)
Portland-Monson Slate Co 465 Congress St Portland 3 Me (9)
Pyrosil Inc 1889 Front St Cuyahoga Falls Ohio (4)
Quigley Co Inc 415 Madison Ave New York 17 NY (3-7)
Raybestos-Manhattan Inc 61 Willett St Passaic NJ (10)
Ruberoid Co 500 Fifth Ave New York 36 NY (3)
Rusgreen Mfg Co 14262 Birwood Ave Detroit 38 Mich (5)
Sauereisen Cements Co 1045 N Canal St Pittsburgh 15 Pa (3-5-7)
Saxonburg Ceramics Inc P O Box 157 Saxonburg Pa (1-8)
Schenectady Varnish Co Inc Congress & 9th Sts Schenectady 1 NY (5-11)
Seton Name Plate Co Inc 50 Fitch St New Haven 15 Conn (12)
Sherwin-Williams Co 101 Prospect Ave NW Cleveland 1 Ohio (5-7-11)
Star Porcelain Co Muirhead Ave Trenton 9 NJ (1-8)
Thermal American Fused Quartz Co 18 Salem St Dover NJ (4)
Union Carbide Corp Silicones Div 30 E 42 St New York 17 NY (5-11)
United States Rubber Co 1230 Avenue of the Americas New York 20 NY (10)
Wilbur & Williams Co Inc 650 Pleasant St Norwood Mass (7)
Zippertubing Co 752 S San Pedro Los Angeles 14 Calif (2)

12V. EXPENDABLE SUPPLIES, MISCELLANEOUS

1. Armature banding
2. Banding & lacing twine
3. Beeswax
4. Cleaning compound
5. Commutator cement
6. Flux & paste
7. Impregnating compound
8. Rust & corrosion preventives
9. Dioy erfhrd & sticks
10. Solder
11. Wire-stripping and pulling compounds
12. Wire & cable tags & markers
13. Controller contacts & fingers
14. Heat-conducting compounds
15. Solenoid & magnet coils
16. Cable sealing compound
17. Wood preservative
18. Thread lubricant

Insulation and tape are listed individually under 12Q, R, S, T and U in this section.

All-State Welding Alloys Co Inc 249-55 Ferris Ave White Plain NY (6-10)
Allen (L B) Co Inc 5624 N Newark at Bryn Mawr Chicago 31 Ill (6-10)
Alpha Metals Inc 60C Water St Jersey City 4 NJ (6-10)
American Products Mfg Co Inc 8127-33 Oleander St New Orleans 18 La (7)
American Silver Co Inc Industrial Div 36-07 Prince St Flushing 54 NY (6)
American Solder & Flux Co 19th & Willard Sts Phila 40 Pa (6-8)
Anaconda Wire & Cable Co 25 Broadway New York 4 NY (12)
Anchor Metal Co Inc 966 Meeker Ave Brooklyn 22 NY (6-10)
Arsco Mfg & Sales Corp 438 Tenth Ave New York 1 NY (8)
Automatic Vulcanizers Corp 16 Hudson St New York 13 NY (7-8)
Benson (Alexander R) Co Inc 2 Davis Rd New Hartford NY (6-10)
Berry (William B) Co 117 Causeway St Boston 14 Mass (12)
Bios Laboratories Inc 17 W 60 St New York 23 NY (3-4-6-7-8-9-10)
Brady (W H) Co 727 W Glendale Ave Milwaukee 9 Wis (12)
Brand (William)-Rex Div American Enka Corp 31 Sudbury Rd Concord Mass (12)
Burnley Battery & Mfg Corp 103 Clay St (P O Box 511) North East Pa (6)
Cable Electric Products Inc 234 Daboll St Providence 7 RI (6-10)
Cannon Electric Co 3208 Humboldt St Los Angeles 31 Calif (15)
Carboline Co 32 Hanley Industrial Ct St Louis 17 Mo (8)
Carbolineum Wood Preserving Co 6683 N 40 St Milwaukee 9 Wisc (8-17)
Chapin (Chas E) Co Inc 227 Fulton St New York 7 NY (13)
Chemalloy Electronics Corp Gillespie Field Santee Calif (10)
Cook's Sons (Adam) Inc 5 N Stiles St Linden NJ (11)
Cool-Amp Co 8603 W 17 Ave Portland 19 Ore (14)
Crown Industrial Products Co 713 Amsterdam St Woodstock Ill (8)
Delta Chemical Works Inc 23 W 60 St New York 23 NY (3-4-6-7-8-10)
Division Lead Co 7742 W 61st Place Summit Ill (6-10-11)
Dow Corning Corp Midland Mich (7-8)
Dunton (M W) Co 350 Kinsley Ave Providence RI (6-10)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (6)
Early (Edward E) Co 1129 5th St N W Canton 3 Ohio (5)
Electrical Fittings Corp 37-50 57th St Woodside 77 NY (11)
Electrical Windings Inc 2015 N Kolmar Ave Chicago 39 Ill (15)
●ELECTRO COMPOUND CO 4145 W 150 St Cleveland 35 Ohio (11-18)—ADV PG 116
Engelhard Industries Inc 113 Astor St Newark 5 NJ (6-10)
Farrelloy Co 1245 N 26th St Phila 21 Pa (6-8-10)
Federated Metals Div American Smelting & Refining Co 120 Broadway New York 5 NY (6-10)
Fidelity Chemical Products Corp 470 Frelinghuysen Ave Newark 12 NJ (4-8-11)
General Electric Co Chemical & Metallurgical Div Silicone Products Dept Waterford NY (7)
Glastic Corp 4321 Glenridge Rd Cleveland 21 Ohio (9)
Hardman (H V) Co Inc 571 Cortlandt St Belleville 9 NJ (7)
Ideal Industries Inc 5136 Park Ave Sycamore Ill (5-11)
Insulation Mfrs Corp 565 W Washington Blvd Chicago 6 Ill (2-9)
Johns-Manville 22 E 40 St New York 16 NY (8-19)
Johnson Mfg Co Inc 600 Anamosa Rd Mt Vernon Iowa (6-10)
Johnston Foil Mfg Co 6106 S Broadway St Louis 11 Mo (10)
Jordan Co 51st & Merrimac Ave Chicago 38 Ill (6)
Kester Solder Co 4201 Wrightwood Ave Chicago 39 Illinois (6-10)

Keyes-Davis Co 74-14th St Battle Creek Mich (12)
Lenk Mfg Co Franklin Ky (6-10)
Lint (Clyde W) 2323 W 18 St Chicago 8 Ill (11)
London Chemical Co Inc 1535 N 31 Ave Melrose Park Ill (6-11)
Ludlow Mfg & Sales Co P O Box 101 Needham Heights 94 Mass (2)
Lukens (Thos F) Metal Co Hedley & Bath Sts Philadelphia 37 Pa (6-10)
Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (5)
Metal & Thermit Corp Rahway NJ (8)
Mico Instrument Co 80 Trowbridge St Cambridge 38 Mass (6-10)
Midland Industrial Div Harrison Paint & Varnish Co 1329 Harrison Ave S W Canton 1 Ohio (8)
●MINERALLAC ELECTRIC CO 25 N Peoria St Chicago 7 Ill (11)—AD PG 124-128-136-139
Mona Industries Inc Paterson 17 NJ (4-8)
Monitor Controller Co 99 Grove St Rockland Mass (13)
National Band & Tag Co 721 York St Newport Ky (12)
National Electric Coil Div McGraw-Edison Co 800 King Ave Columbus 16 Ohio (1-2-7-9-10)
National Lead Co 111 Broadway NY 6 NY (6-10)
North Shore Nameplate Div Anodyne Inc 214-27 Northern Blvd Bayside NY (12)
Northwoods Mfg Chemists Inc Porterfield Wis (4)
Ohio Carbon Co 12508 Berea Rd Cleveland 11 Ohio (13)
Okun (A L) Co Inc 109-02 Van Wyck Expressway South Ozone Park NY (10)
Penetone Co 74 Hudson Ave Tenafly NJ (4-8)
Penn Fibre & Specialty Co Inc 2024 E Westmoreland St Phila 34 Pa (12)
Permacel U S Highway 1 New Brunswick NJ (4-7)
Plymouth Rubber Co Inc 23 Revere St Canton Mass (18)
Porcelain Products Co 224 N Patterson St Carey Ohio (10)
Premax Products Div Chisholm-Ryder Co Inc College & Highland Aves Niagara Falls NY (12)
River Smelting & Refining Co 4195 Bradley Rd (P O Box 5755) Cleveland 1 Ohio (10)
Ruby Chemical Co 68-70 McDowell St (P O Box 1108) Columbus 16 Ohio (6-10)
Rust-Oleum Corp 2425 Oakton St Evanston Ill (8)
Sherwin-Williams Co 101 Prospect Ave N W Cleveland 1 Ohio (7)
Silicone Insulation Inc 1383 Seabury Ave Bronx 61 NY (9)
Sittler Corp 18 N Ada St Chicago 7 Ill (5)
Smith Welding Equipment Corp 2633 4th St S E Minneapolis 14 Minn (6)
Stackpole Carbon Co Stackpole St St Marys Pa (13)
Subox Inc Fairmont Plant Hackensack NJ (8)
Sulfo Inc 1143 E Jersey St Elizabeth 4 NJ (6)
Superior Carbon Products Co 9115 George Ave Cleveland 5 Ohio (13)
Thermon Mfg Co 1017 Rosine St Houston Tex (14)
Turco Products Inc 24600 S Main St Wilmington Calif (4-8)
Union Carbide Corp Silicones Div 30 E 42 St New York 17 NY (7-16)
Waveland Electric Co 5542 N Ashland Ave Chicago 40 Ill (5-13)
Westinghouse Electric Corp P O Box 868 Pittsburgh 30 Pa (13)
Westline Products Div Western Lithograph Co 600 E Second St Los Angeles 54 Calif (12)
Wilbur & Williams Co Inc 650 Pleasant St Norwood Mass (8)
Wilmington Fibre Specialty Co New Castle Dela (9)
Zippertubing Co 752 S San Pedro Los Angeles 14 Calif (12)

12W. PERSONNEL PROTECTIVE EQUIPMENT

1. Clothing
2. Eyeshields & goggles
3. Face shields & masks
4. Respirators

Charleston Rubber Co Stark Industrial Park Charleston SC (1)
DeVilbiss Co 300 Phillips Ave Toledo 1 Ohio (4)
Dockson Corp 3839 Wabash Ave Detroit 8 Mich (2-3-4)
General Scientific Equipment Co Limekiln Pike & Williams Ave Philadelphia 50 Pa (1-2-3-4)
Kedman Co 233 S Fifth West St Salt Lake City Utah (3)
Lincoln Electric Co 22801 St Clair Ave Cleveland 17 Ohio (2-3)
Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (2-3-4)
Mine Safety Appliances Co 201 N Braddock Ave Pittsburgh 8 Pa (2-3-4)
Schauer Mfg Corp 4500 Alpine Ave Cincinnati 42 Ohio (2)
Smith Welding Equipment Corp 2633 4th St S E Minneapolis 14 Minn (2)
Snyder (M L) & Son Inc 1897 E York St Phila 25 Pa (1)
Standard Portable Cord Co Inc Mayville NY (2)

12X. MATERIAL PRICING SERVICE

Complete pricing information on all types of electrical equipment.

Biddle Trade Publishing Co 2720 Beverly Blvd Los Angeles 57 Calif
●HENDERSON-HAZEL CORP 13601 Euclid Ave Cleveland 12 Ohio—ADV PG 139
Trade Service Publications Inc 341 E Ohio St Chicago 11 Ill

TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers* on the Free Information cards elsewhere in this issue.

*Code No.	Description, Pages Catalog No. & Mfr.
12-1	Fastening Devices; 23p; Cat. No. 9 (Ackerman-Johnson)
12-2	Anchoring & Drilling Devices; 42p; Cat. No. 71 (Arro)
12-3	Scaffolds; 14p; Cat. No. 10-559 (Baker-Roos)
12-4	Electric Tools; 72p; Cat. No. 1(G) (Black & Decker)
12-5	Carenco Tool Brushes; 47p (Carbon Engineering)
12-6	Screw Anchors; 7p; Cat. No. 868 (Chance)
12-7	Oilers, Tubes, Valves, Assemblies; 12p; Cat. No. B-60 (Eynon-Dakin Co)
12-8	Tools; 8p; Cat. No. E-240 (Greenlee)
12-9	Drill Anchors; 6p; Cat. No. 4-H (Gregory)
12-10	Nelson Stud Driving System; 8p; Cat. No. N-160 (Gregory)
12-11	Carbon Brushes; 118p; Cat. No. 58 (Helwig)
12-12	Motor & Generator Brushes; 25 p; Cat. No. 95 (Helwig)
12-13	Tools; 331p; Cat. No. 1959 (Hunter)
12-14	Insulation; 4p; Cat. No. 33 (Insulation Mfg)
12-15	Vacuum Cleaners; 15p (Invincible)
12-16	Grips for Cable; 32p; Cat. No. 51 (Kellems)
12-17	Grips for Industry; 24p; Cat. No. 60 (Kellems)
12-18	Electric Tools; 34p; Cat. No. G6-1 (Milwaukee)
12-19	Hole Saws; 8p; Cat. No. 958 (Misener)
12-20	Arc Welders; 20p; Cat. No. 158 (Ohio Carbon)
12-21	Power Tools; 5p; Cat. No. 8-29R (Omark)
12-22	Hand Tools; 15p; Cat. No. H-9 (Owatonna)
12-23	Maintenance Equipment; 23p; Cat. No. P-9 (Owatonna)
12-24	Hand Trucks; 36p; Cat. No. 659 (Pucal)
12-25	Fasteners; 11p; Cat. No. 17F (Ramset)
12-26	Carbon Brushes; 35p; Cat. No. K-194 (Ringsdorf)
12-27	Materials Handling Equipment; 16p (Sasgen)
12-28	Maintenance Products; 20p; Cat. No. 557 (Sittler)
12-29	Vacuum Cleaners; 35p (Tornado)
12-30	Lubricating & Electrical Devices; 10p; Cat. No. 59 (Trico)
12-31	Silicones; 15p; Cat. No. SF-1030 (Union Carbide)
12-32	Silicones; 15p; Cat. No. SF-1031 (Union Carbide)

Technical Books

Summaries of recently published books of interest to specifiers, designers, and installers of electrical equipment.

ELECTRICITY

Foundations of Electromagnetic Theory, by John R. Reitz and Frederick J. Milford. 387 pages; $8.75. Addison-Wesley Publishing Co., Inc., Reading, Mass.

A comprehensive treatment of electrostatics, dielectrics, magnetic fields, physics of plasmas for the man with a sound background in mathematics.

Principles of Electricity and Magnetism, by Emerson M. Pugh and Emerson W. Pugh. 430 pages; $8.75. Addison-Wesley Publishing Co., Inc., Reading, Massachusetts.

A text for the advanced undergraduate level covering electro-magnetic radiation. Knowledge of calculus is necessary; higher mathematics where needed are explained in connection with the theory to which they apply.

Introduction to Modern Network Synthesis, by M. E. Van Valkenburg. 498 pages; $11.75. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.

An advanced text applying mathematics to the solution of problems in passive networks, automatic control systems, and active networks. Complete mathematical background, including some network analysis, is mandatory for users of this book.

Fundamentals of Electricity, by McDougal, Ranson, Dunlap and Graham. Fourth edition. 342 pages $4.75 American Technical Society, 848 East Fifty-Eighth St., Chicago 37, Ill.

All basic principles are presented beginning with the nature of electricity and relating fundamentals to modern applications of electricity. Included is a dictionary of electrical terms plus graphical symbols and electrical formulas.

Maintenance Hints Handbook, 650 pages, $2.00. Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

Designed to provide quick, complete and convenient guide to modern maintenance practices on all types of electrical equipment. First section covers specific apparatus maintenance; second covers general maintenance of materials used in apparatus, such as insulation. All chapters updated and revised, including new chapter on maintenance of static controls.

Electrical Engineering Materials, by A. J. Dekker. 208 pages, $8.00. Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y.

A complete discussion of methods and models used to determine the properties of materials most important to the electrical engineer. Dielectric, magnetic and conductive properties are treated separately, with practical exercises to which the reader can apply his knowledge of elementary field theory.

Electric Motors and Generators, by Emery, Harrabin, Lee, Nixon and Rapson. 384 pages, $12.00. Philosophical Library, Inc., 15 E. 40th St., New York, N. Y.

An up-to-date, practical guide with many drawings and diagrams illustrating the use of motors and generators, principles of design, armature and rotor construction, field and armature windings, starters and speed control, generator primary power, testing, commutation and maintenance. Emphasis is on practical understanding rather than theoretical considerations.

Electrical Equipment Manual, by J. F. McPartland and W. J. Novak. 176 pages, $4.00. Electrical Wholesaling, Dept. 270-059B, 330 W. 42nd St., N. Y. 36, N. Y.

A practical, easy-to-use reference for anyone desiring or requiring a ready background in the fundamentals of electrical equipment. Through a format of carefully balanced copy and graphic sketches, the book explains in a simple yet comprehensive manner the basics of today's electrical equipment—from lamps, fixtures, motors and raceways to sound systems, transformers and pole lines.

Switchgear Principles, by P. H. G. Crane. 238 pages; $3.75 postpaid. Cleaver-Hume Press Ltd., 31 Wright's Lane, London W8, England.

A basic reference covering all aspects of the subject from bushings to cubicles. Chapters treat transmission and distribution systems, short circuits and overvoltages, electrical discharges, principles of circuit-breaking, oil and air breakers, switchgear types and components, and tests and specifications.

Electric Traction Engineering, by E. A. Binney. 224 pages; $2.50 postpaid. Cleaver-Hume Press Ltd., 31 Wright's Lane, London W8, England.

A unique book devoted exclusively to the highly specialized application of electricity to electric railways and transit vehicles. The exacting limitations encountered in the field demand specially designed apparatus and circuiting. This book applies basic electrical fundamentals to the solutions of these problems, with complete explanations of various traction systems in use, traction motors, diesel-electric generators, mechanical drives, and control.

Principles of Alternating Currents, by W. Slucking & J. R. Greener, Second Edition. 338 pages; $2.40 postpaid. Cleaver-Hume Press Ltd., 31 Wright's Lane, London W8, England.

A practical approach to ac circuits and apparatus. After discussing the nature of electricity and alternating currents in general, this book covers vector representation and types of ac circuits; operation of single and polyphase systems; principles and operation of transformers; power transmission and distribution, power factor improvement; and ac measurements. Special coverage is included on electronic principles and their application to power work, plus a discussion of typical utilizing apparatus such as induction and dielectric heating equipment and electric discharge lighting. Test questions and answers are included for self-study.

Primer of Lamps and Lighting, by Willard Allphin; 224 pages, $10.00. Chilton Co., Book Div., 56th and Chestnut Sts., Philadelphia 39, Pa.

A practical treatment of all types of lamps for commercial, residential and industrial applications for lighting salesmen, electrical contractors, foremen, architects, maintenance superintendents, and students. Illustrated with photographs, charts and graphs, the book describes lamp operation in detail, covers methods of determining lighting levels and number of required fixtures, and included a slide rule for making lighting calculations.

Electrical Trade Book, Trade Service Publications, 117 E 37th St., New York, N. Y. (Prices supplied on request.)

A condensed and illustrated cost book for electrical contractors, including a binder and index tabs covering the complete range of products used in electrical construction. Cost data is supplemented by information on comparative catalog numbers and cash discounts.

Electrical Engineering for Professional Engineers' Examinations, by John D. Constance; 456 pages, $9.50. McGraw-Hill Publishing Co., 327 W. 41st St., New York 36, N. Y.

This book offers candidates for Professional Engineer's license the materials they need to prepare for the electrical engineering examination. Each question is followed by the type of answer expected by the boards of examiners in the various states.

Connecting Induction Motors: Operation and Practice, by A. M. Dudley and Samuel F. Henderson. Fourth Edition; 425 pages; $13.50. McGraw-Hill Book Co., 327 W. 41st St., New York 36, N. Y.

New revision presents up-to-date data on operation and repair of both single and polyphase induction motors plus new chapters on part-winding starting connections, single-phase connections, multispeed polyphase motors, and use of motor nameplate data.

Constructing Electrical Systems, by McPartland and editors of **Electrical Construction and Maintenance**. $4.50. **Electrical Construction and Maintenance**, 330 W. 42nd St., New York 36, N. Y.

A comprehensive reference and instruction manual on the methods and techniques used in constructing systems for power, light, signals, and communications, with particular emphasis on the 1959 National Electrical Code.

Electrical Design Details, by Joseph F. McPartland and W. J. Novak. 231 pages; $8.50. McGraw-Hill Book Co., 330 W 42nd St., New York 36, N. Y.

The electrical man's idea book; a compilation of wiring diagrams, schematics, equipment layouts, and installation details on all types of electrical equipment in commercial, industrial, and residential buildings.

Electrical Systems Design, by Joseph F. McPartland and editors of **Electrical Construction and Maintenance**, 220 pages. Second Edition, $7.75. McGraw-Hill Book Co., 327 W. 41st St., New York 36, N. Y.

Modern standards, procedures, and developments in electrical systems design are brought together in revision of practical guidebook. Covering power, light, heat, air conditioning, signals and communications for industrial, commercial, and residential structures, the book relates services, feeders and branch circuits to modern design and basic safety requirements of the National Electrical Code. Over 200 diagrams and drawings show step-by-step procedures for selecting designs, for implementing these designs with actual equipment, and for incorporating the resulting system within the physical dimension of the building.

Elevators: Electric and Electro-Hydraulic Elevators, Escalators, Moving Sidewalks and Ramps, by Fred A. Annett. Third Edition; 400 pages; $11.50. McGraw-Hill Book Co., 327 W. 41st St., New York 36, N. Y.

A comprehensive and practical treatment of vertical-transportation equipment as used in office buildings, hotels, apartment houses, private homes, and other buildings. It provides a useful and authoritative source of information for electrical workers and mechanics interested in the construction, operation and maintenance of such equipment.

Theory and Design of Small Induction Motors, by Cyril G. Veinott. 492 pages, $13.50. McGraw-Hill Book Co., 327 W. 41st St., New York 36, N. Y.

A comprehensive coverage of the engineering, application, and design procedures that must be taken into account when working with small induction motors. Organized in four separate parts, the book describes engineering principles and characteristics, treats theory and performance calculations, provides methods and formulas for analyzing a given design, and shows how to design a machine to meet specified objectives.

Modern Schools are Heated Electrically, EEI Publication 59-214, 20 pages, $1.25. Sales Div., Edison Electric Institute, 750 Third Ave., New York 17, N. Y.

Prefaced by a section outlining the advantages of electric heat in schools, this report lists 212 schools in 19 states which have installed electric heat. Data include number of classrooms and other rooms, connected heating load, type of heating equipment, degree days, and date of installation for each school.

Engineering Manual: A Practical Reference of Data and Methods in Architectural, Chemical, Civil, Electrical, Mechanical, and Nuclear Engineering, edited by John H. Perry. 680 pages; $9.50. McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y.

A concise reference to the most commonly used data in these engineering fields, covering every major phase of engineering from physical laws involved in the structural design of buildings, to illustrated instructions on high-way and traffic engineering—from simple, overall coverage of ac and dc circuits and machines, to recommended practices for meeting today's requirements in the nuclear power fields. Three separate sections present mathematics, mathematical tables, and physical and chemical data.

Electric Heating and Cooling Fact Book, 52 pages, $1.00. Electrical Information Publishers Inc., 2132 Fordem Ave., Madion 1, Wis.

1960 issue contains over 240 listings of electric resistance heaters, heat pumps, and control equipment, with market information, hints on wiring, and a section on insulation.

Fundamentals of Electricity, by Calving C. Bishop, 230 pages, $6.95. Chilton Co., Book Div., 56th and Chestnut Sts., Philadelphia 39, Pa.

A reference book for technicians and engineers. More advanced than most basic texts, this book provides mathematical analyses and backgrounds for each phase covered. General categories include early investigations and basic discoveries, methods of generating electricity, units of measurement, magnets, ac circuits and apparatus, dc motors and generators, batteries and electrolytes, electronic principles, and discoveries in nuclear science.

Motor Selection and Application, by Charles C. Libby. 486 pages, $13.50. McGraw-Hill Book Co., 327 W. 41st St., New York 36, N. Y.

How to select and apply electric motors for specific industrial uses, based on load characteristics, service requirements, space limitations, duty cycle requirements, and safety. With a minimum of mathematics and theory, this book covers motor temperature rise, motor life, load torque characteristics, and motor enclosures for induction, synchronous, and dc motors.

Estimator's Electrical Man-Hour Manual, by John S. Page and Jim G. Nation; 219 pages; $10.00. Gulf Publishing Co., P. O. Box 2608, Houston 1, Texas.

A standardized method and procedure of estimating electrical installation labor in manhours. Thousands of manhours are listed for conduit, boxes and fittings; service and feeder wiring; branch circuit items; lighting fixtures; panelboards and cabinets; safety switches; hangers and fasteners; underfloor raceway and busway; starters and motors; outside and underground construction; signal systems; and demolition and excavation. Tables are based on hundreds of time-and-motion studies showing an average productivity rate of 70%.

Practical Residential Wiring, by John F. Nowak. 511 pages, $7.95. D. Van Nostrand Co. Inc., Princeton, N. J.

New revision of practical book gives extensive information on all aspects of home wiring including circuiting, tools and splicing, plan reading, wiring methods, testing, and trouble-shooting. A chapter is devoted to estimating electrical installations for small-house wiring; National Electrical Code tables are given in a glossary.

Fundamentals of Electricity, by Kennard C. Graham; 342 pages, $4.75. American Technical Society, 848 E. 58th St., Chicago 37, Ill.

Beginning with the nature of electricity and following with a detailed treatment of circuits, circuit elements and basic electrical machinery, this book provides a solid foundation in electrical fundamentals. New materials on intercom systems, television transmitters and camera tubes, radar, and devices used in automation bring the reader up to date in modern applications of electricity.

Electrical Maintenance and Repairs, by J. L. Watts; 324 pages; $3.25 postpaid. Cleaver-Hume Press Ltd., 31 Wright's Lane, London W8, Great Britain.

And excellent book for aiding maintenance staffs in keeping down operating costs, getting repair jobs done without interrupting production, and keeping wiring installations in order. The routine of fault location and plant repairs—from renewing sleeve bearings to diagnosing faults in mercury are rectifiers—is set down systematically and summarized in tables. Sections on wiring are valuable to contractors; test questions for students will also be helpful reminders to the man on the job.

Electrical and Electronic Drawing, by Charles J. Baer; 218 pages, $6.00. McGraw-Hill Book Co., 327 W. 41st st., New York 36, N. Y.

An up-to-date picture of the entire electrical drawing field, including the latest symbology and practice. The book covers the preparation of pictorial drawings, connections drawings and diagrams, block diagrams, and schematic. Standard engineering, production or working drawings are included where specific examples of this type deserve special mention.

Electrical Efficiency in Industrial Power Plants, by Edwin S. Lincoln; 235 pages; $9.50. F. W. Dodge Corp., 119 W. 40th St., New York 18, N. Y.

A practical engineering guide to lower power costs, telling exactly how to make surveys of load, power factor, voltage, lighting, wiring, and electrical protection. All necessary instruments are discussed in detail, with emphasis on their selection, continued use, and maintenance. Particular attention is paid to methods of lowering rates by minimizing peak demands.

Practical Electricity and House Wiring, by Herbert P. Richter; 320 pages; $4.00. Frederick J. Drake & Co., 9 S. Clinton St., Chicage 6, Ill.

Covers in detail all branches of electrical work associated with the wiring of small buildings. Common electrical devices, wire and cable, motors, and appliances are discussed in detail; special chapters deal with the National Electrical Code, wiring farm buildings, modernization, and lighting principles.

Transformers and Generators for Power Systems, by R. Langlois-Berthelot; 541 pages; $12.00. Philosophical Library, Inc., 15 E. 40th St., New York, N. Y.

This volume is divided into two parts, each a book in itself. The first deals exclusively with the transformer, covering single- and 3-phase transformer theory, winding design, insulation, cooling and voltage regulations. The second book covers the synchromous machine, including theory, insulation, cooling, and transient conditions. Both parts contain sections intended as a guide for the specifications and operating engineer.

Resistance and Resistors, by Charles L. Wellard; 264 pages; $8.50. McGraw-Hill Book Co., 327 W. 41st., New York 36, N. Y.

A practical reference dealing with all types of resistors, materials used in their manufacture, and the characteristics associated with each type. Included, along with all the more well-known resistors, are the thermistor, varistor, and printed circuits.

The Relay Guide, by Raymond N. Auger; 383 pages; $10.00. Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y.

A complete reference including virtually all published data on hundreds of available models of relays from approximately 200 manufacturers. Each model is illustrated; information presented includes application data, circuiting, ratings, and definitions of terms.

Professional Engineer's Examination Questions and Answers, 2nd edition, by William S. La Londe, Jr.; 589 pages; $7.50. McGraw-Hill Book Co., 327 W. 41st St. New York 36, N. Y.

An authoritive guide to help in the preparation for license examinations. Over 600 questions are presented, selected from recent actual examinations for the Professional Engineer License, the Land Surveyor License, and the Engineer-in-Training Certificate. For every question there is a detailed answer of the type that is accepted by the examiner.

Metallic Rectifiers, Principles and Applications, by Leonard R. Crow; 280 pages; $3.00. Howard W. Sams & Co., 1720 E. 38th St., Indianapolis 6, Ind.

Principles, types, and versatile uses of the copper oxide, selenium, magnesium-copper, and silicon rectifiers are covered in sixteen chapters. Numerous photos and diagrams clarify operation and application of circuits for the reader interested in principles rather than design and manufacture.

Design Manual on Steel Electrical Raceways, 137 pages; $1.00 each; 50¢ each in quantities of 10 or more. American Iron and Steel Institute, 150 E. Forty-Second St., New York 17, N. Y.

A guide to modern design and installation of steel raceways in all types of electrical wiring systems. Consisting largely of drawings, diagrams, and tables, this manual provides electrical designers and installers with a ready source of information on distribution systems for industrial, institutional, commercial, and residential occupancies, with particular attention to the National Electrical Code.

ELECTRONICS AND COMMUNICATIONS

TV Distribution Systems and Antenna Techniques, by Jack Beever. 167 pages; $2.95; Howard W. Sams & Co., Indianapolis 6, Ind.

A thorough explanation of all factors affecting antenna system operation and installation, including transmission lines, multiple-TV systems, trouble-shooting, bids and estimates.

Radio-Television Electronic Dictionary, compiled by Harold P. Manly. $4.00; Frederick J. Drake & Co., 9 S. Clinton St., Chicago 6. Ill.

A complete alphabetical compilation of words, terms and abbreviations, with many drawings of equipment, components, and circuits.

Medical Electronics, by Edward J. Bukstein. 168 pages, $3.50; Frederick Ungar Publishing Co., 131 East 23rd St., New York 10, N. Y.

A survey of the use of electronic equipment in practice and research. Subjects discussed include recorders, radioisotopes, X-ray apparatus, diathermy and inducthermy, and ultrasonics.

Electronic Circuits, Signals, and Systems, by Samuel J. Mason and Henry J. Zimmerman. 616 pages; $12.50; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.

A comprehensive book presenting matrix, topological, and signal-flow-graph methods of circuit and signal analyses, plus complete treatments of the transmission of signals thru linear systems, nonlinear and time-varying linear systems, and negative feedback.

Industrial Sound Systems, by Leo G. Sands. 270 pages; $3.95; Howard W. Sams & Co., 2201 E. 46th St., Indianapolis, Ind.

A complete description of the operation, installation and servicing of various types of sound and intercom systems being used in industrial and commercial buildings; including amplifiers, input devices, loudspeakers, control circuits, portable and mobile equipment, and distribution methods.

2-Way Mobile Radio Handbook, by Jack Helmi. 207 pages; $3.95; Howard W. Sams & Co., 2201 E. 46th St., Indianapolis, Ind.

Complete treatment of subject covering operational theory of basic systems, receivers, transmitters, control systems, and power, plus an extensive discussion on servicing.

Electronics for the Beginner, by J. A. Stanley. 190 pages; $3.95; Howard W. Sams & Co., 2201 E. 46th St., Indianapolis, Ind.

Completely avoiding theory and mathematics, this book carries the inexperienced through simple explanations of electronic equipment and circuitry, with step-by-step instructions for building components.

Radio Data Book, by William F. Boyce and Joseph J. Roche. 890 pages; $4.95; Howard W. Sams & Co., Inc., 2201 E. 46th St., Indianapolis, Ind.

A comprehensive volume in 18 sections covering in detail the fundamentals of radio, television and electronics, sound systems, and meters and test equipment.

Closed Circuit Television Systems, 348 pages; $4.50. Government Service Dept., RCA Service Co., Camden 8, N. J.

Fundamentals and techniques of closed-circuit TV; characteristics and typical applications of various types of commercial equipment. To assist in the proper engineering of closed-circuit systems, factors are described which assure reliable performance under various environmental conditions.

Handbook of Electronic Control Circuits, by John Markus. 350 pages; $8.50. McGraw-Hill Book Co., 327 W. 41st St., New York 36, N. Y.

Comprehensive compilation giving industrial electronic and design engineers a selected reference to over 250 electronic circuits, each complete with values of components. From it can be obtained the salient points of a number of circuits of a given type as a guide for choosing the most promising circuit for a particular application.

Industrial Electronics Handbook, edited by W. D. Cockrell, General Electric Co. 1408 pages, $22.50. McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y.

Authoritative descriptive and reference material covering all phases of industrial electronics and control, with an emphasis on application and the user's needs rather than on design. Nine sections by some 100 contributing experts cover basic engineering and mathematics, control elements, power supplies, control circuits and applications, electronic switches, military application, automation, process control, etc.

The Practical Dictionary of Electricity and Electronics, by R. L. Oldfield. 216 pages, $5.95. American Technical Society, 848 E. 58th St., Chicago 37, Ill.

This book, in basic dictionary form, clears up troublesome terms in basic electricity and electronics, with many diagrams and drawings to help in visualizing the action or term being defined. In addition, many tables, symbol charts, and formulas most often used have been gathered together in an appendix and arranged for quick reference, including diagrams of such equipment as starters and regulators, transformers and power supplies.

Fixed and Variable Capacitors, by G. W. A. Dummer and Harold M. Nordenberg. 281 pages, $10.00. McGraw-Hill Book Co., 327 W. 41st St., New York 36, N. Y.

A working knowledge of capacitor design and construction to aid in selecting and applying fixed and variable capacitors in modern electronic equipment. Included are characteristics and applications of paper, mica, ceramic, glass, vitreous enamel, electrolytic, gas-filled, and other fixed capacitors plus full range of variable devices.

Modern Electronic Components, by G. W. A. Dummer. 472 pages, $15.00. Pitman Publishing Corp., 2 West 45th St., New York 36, N. Y.

A comprehensive survey of the characteristics of the more common components used in today's electronic equipment. Profusely illustrated, the book covers such equipment as fixed and variable resistors, fixed and variable capacitors, wires and cables, plugs and sockets, relays, switches, inductors, transformers, and transistors. Additional chapters cover effects of vibration, shock and nuclear radiation, testing methods, possible faults, and packing and preservation.

Industrial Electronics in Questions and Answers, by Edward J. Bukstein. 197 pages, $3.95. Frederick Ungar Publishing Co., 105 E. 24th St., New York 10, N. Y.

A practical book covering resistance welding and photoelectricity, thyratrons, time-delay circuits, counters, scalers, and test instruments. Data is presented in the form of question and answers, beginning with the most elementary and progressing to a complete explanation of the circuits involved.

Industrial Electronics, by the technical staff of the Coyne Electrical School; 496 pages; $3.75. Howard W. Sams & Co., Inc., 2201 E. 46th St., Indianapolis 5, Ind.

The field of industrial electronics is covered in practical language from the elementary principles to the various types of tubes, their applications, and the servicing, testing and trouble-shooting of electronic equipment.

Mathematical Tables and Formulae, by F. J. Camm. Sixth Edition. 144 pages; $2.75. Philosophical Library, 15 E. Fortieth Street, New York 18, N. Y.

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July, 1959 through June, 1960

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THE following index covers the editorial contents of the 13 issues of *Electrical Construction and Maintenance* published from July, 1959 through June, 1960. It is arranged in six sections. Items are listed alphabetically in each section, showing the month of issue and page number.

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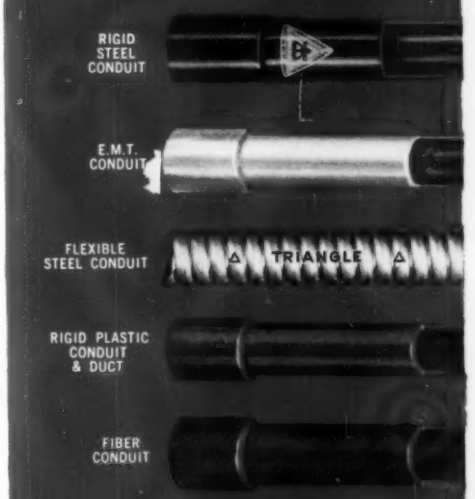

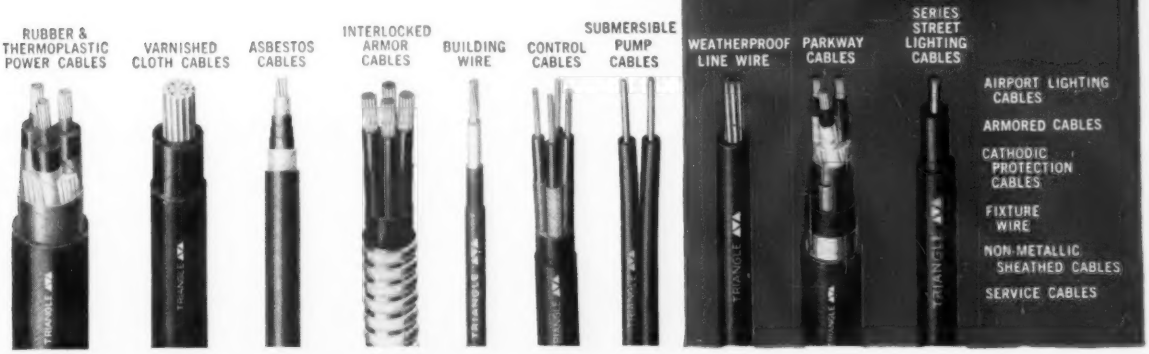

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